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CARRIAGE IRONWORK,

— BY —

WM. N. FITZ-GERALD.

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THE
BLACKSMITHS' HAND BOOK,
IRON WORK

—: OF :—

Carriages Tabulated,

AND

USEFUL INSTRUCTIONS,

—: BY :—

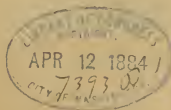
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HARNESS MAKERS' ATLAS, &c.

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GENERAL NOTICE REGARDING THE IRON IN THE TABLES.

The kinds of metals selected are those possessing the best qualities and best adapted to each part. These grades may not always be accessible; when this is the case select a brand that approximates nearest to the one specified; in place of Low Moor for piece part to axle beds use L. W. or Burden's. Norway is the most tenacious and malleable iron used by carriage makers, and should always be kept in stock. Where Norway is recommended, and it cannot be had, substitute Ulster, but do not substitute Norway for Ulster, as it is not stiff enough; Burden's or Low Moor should be used instead. Let Norway, Low Moor, Ulster and Burden's be the standard, always selecting the brands that are nearest possessing their peculiar qualities when these are not available.

Where lengths and widths are omitted, these are dependent upon the size of the frame or other portion to which the irons are attached.

No. 1.

Table of Kinds and Sizes of Iron Used in Constructing a 125 Pound Road Wagon on Half Springs.

Sectional Parts.	Metal.	Shape.	Size.
Axles, nut.....	Steel.....	Straight.....	5x6 inches.
Piece part, front.....	Burden's iron.....	.....	1x1½ inch.
Piece part, back.....	Burden's iron.....	.....	1x5/8 inch.
Beds, full length.....	.....	.....	3 feet 4 inches.
Springs.....	.....	.....	1½ inches.
Length from center of bar bearings.....	Swedes steel, oil temper.	Half elliptic, 2 plates.	{ 21 inches. No. 5.
Plates.....			
Fifth wheel.....	Norway iron.....	Half circle.....	9 inches.
Plates.....	.....	Half round.....	1½ inch.
Bolts.....	Norway iron.....	.....	1½ inch.
Head plates.....	Norway iron.....	Flat.....	5x1½ inch.
Bolts.....	Norway iron.....	.....	1½ inch.
Shaft irons.....	Burden's iron.....	Swaged.....	1½x¾ inch
Length front of bar.....	.....	.....	6 inches.
Length on bar.....	.....	.....	5 inches.
Bolts.....	Norway iron.....	Round heads.....	¾ inch.
Jack clips.....	Norway iron.....	Saunders.....	No. 1.
Clip part.....	.....	Flat.....	5/8 inch.
Bolt part.....	.....	Round.....	¾ inch.
Axle, heel part.....	.....	Flat.....	1 inch.
Perch plates.....	Norway iron.....	Flat.....	5x1½ inch.
Heel clips, length bottom.....	Norway iron.....	Flat.....	10 inches.
Heel clips, length top.....	Norway iron.....	Flat.....	6 inches.
Bolts.....	Norway iron.....	.....	1½ inch.
Side stays.....	Burden's iron.....	Oval.....	3x17/8 inch.
Ends.....	Norway iron.....	.....	.....
Bolts, front.....	Norway iron.....	Square heads.....	1½ inch.
Bolts at butts.....	Norway iron.....	Square heads.....	¾ inch.
Clip king bolt.....	Norway iron.....	Strap.....	5/8 inch.
Bolt part.....	.....	.....	¾ inch.
Tire.....	Steel.....	.....	5x3-32 inch.
Bolts at joints.....	Norway iron.....	.....	1½ inch.
Screws.....	.....	.....	5/8 No. 8.
Step pads.....	Norway iron.....	Square.....	3x3¼ inches.
Shanks.....	Ulster iron.....	Oval.....	7x17/8 inch.
Back stays.....	Ulster iron.....	Round.....	5/8 inch.
Bolts.....	Norway iron.....	.....	1½ inch.
Dash, light.....	.....	.....	10 inches.
Main and bottom bars.....	.....	Oval.....	1½x1½ inches.
Other bars.....	.....	Oval.....	3x1½ inch.
Heels.....	Norway iron.....	.....	1½x¾ inch.
Foot rod.....	Ulster iron.....	Oval.....	1½x¾ inch.
Seat stays.....	Ulster iron.....	Oval.....	3x17/8 inch.
Wear iron, length.....	Steel.....	Flat.....	4½ inches.

THE BLACKSMITH.

The artist who pictures a blacksmith, portrays a brawny fellow, with huge hands and muscles of an athlete, thus conveying the idea that his occupation is one that depends almost entirely upon physical force. Longfellow says:

"The smith, a mighty man is he,
With large and sinewy hands;
And the muscles of his brawny arms
Are strong as iron bands."

Physically he should be all this, but if his mental is not equal to his physical power he is not a true representative of his craft, it requires something more than brute force to mold the iron to its proper shape. A knowledge of the characteristics of the metal used, great perception, prompt action and absolute precision are necessary, he must "strike while the iron is hot" every blow must be in the right place, he has no time to stop and ponder over the best course to pursue, a minute-wasted loses a heat, he must think and strike at the same time; each blow must do its part and be given with a force in keeping with the condition of his heat. Then, too, he must have a practiced eye for curves. With a carriage blacksmith their are few sweeps that can be made to a pattern, and the more thorough the training of the eye and hand the more perfect the work. With young men learning the trade there is too little thought given to drawing, they cannot understand how the knowledge of free hand or mechanical drawing can aid them, but as they become more and more skilled, they appreciate more fully the want of that knowledge. A thorough understanding of free hand drawing imparts confidence and aids to cultivate one great requisite, for promptness, besides cultivating correct taste. The blacksmith that can place a correct free-hand-drawing on a draft board can with equal accuracy shape his irons to a true sweep.

He should be able to make a complete working drawing of the carriage or gear and all of its individual parts. The working drawing that governs the body maker, should be equally clear to the blacksmith, and if he is competent to design and place upon the black-board a carriage complete from every point of view, the labor of making it will be materially decreased. "Think between heats" should be the motto and habit of every man who works at the forge.

No. 2.

Table of Kinds and Sizes of Iron Used in Constructing a Top Buggy Weighing about 240 Pounds.

Sectional Parts.	Metal.	Shape.	Size.
Axles, nut.	Steel.	Plain taper.	7x6 $\frac{1}{2}$ inches.
Piece part, front.	B. B. iron		14x7 $\frac{1}{2}$ inch.
Piece part, back.	Low Moor iron		14x3 $\frac{1}{2}$ inch.
Springs, three plates	Best Swedes steel.	Full elliptic button heads, round ends.	14 inch.
Length			32 inches.
Back, open.			8 inches.
Front, open.			7 inches.
Main plates.			No. 4.
Other plates.			No. 5.
Springs for side bars.		Half elliptic.	14 inches.
Length from center of bearings			25 inches.
Two plates.			No. 5.
Fifth wheel	Norway iron.	Half circle.	12 inches.
Plates		Half round.	7 $\frac{1}{2}$ inch.
Bolts			1 $\frac{1}{2}$ inch.
Head plates.	Norway iron.		4x4 inch.
Bolts			1 $\frac{1}{2}$ inch.
Shaft irons.	Burden's iron		14x7 $\frac{1}{2}$ inch.
Length of front bar.			8 inches.
Length on bar.			6 inches.
Bolts	Norway iron.	Flat heads.	1 $\frac{1}{2}$ inch.
Jack clips.	Norway iron.		1 inch.
Heel part.			1 $\frac{1}{2}$ inch.
Bolt part.			1 $\frac{1}{2}$ inch.
Perch plates, ends.	Norway iron.		4x4 inch.
Center.	Burden's iron.	Flat	4x7 $\frac{1}{2}$ inch.
Heel clips, bottom.			10 inches long.
Heel clips, top.			6 inches long.
Bolts	Norway iron.		1 $\frac{1}{2}$ inch.
Side stays.	B. B. iron	Oval	3x3 $\frac{1}{2}$ inch.
Ends	Norway iron.	Square	3x3 $\frac{1}{2}$ inch.
Bolts, front.	Norway iron.	Round heads.	1 $\frac{1}{2}$ inch.
Bolts, at butts.	Norway iron.		1 $\frac{1}{2}$ inch.
Spring bar bolts.	Norway iron.		1 $\frac{1}{2}$ inch.
Clip king bolt.	Norway iron.		7 $\frac{1}{2}$ inch.
Bolt part.			1 $\frac{1}{2}$ inch.
Body loops.	B. B. iron	Swaged	1x1 $\frac{1}{2}$ inch.
At heads.			4x3 $\frac{1}{2}$ inch.
Head		Round	7x7 $\frac{1}{2}$ inch.
Strap on bottom.	Band iron.		1x1 inch.
Bolts for heads.	Norway iron.	Cone heads.	1 $\frac{1}{2}$ inch.
Bolts for corners.	Norway iron.	Flat heads.	1 inch.
Cross spring.	Steel	Timken	No. 2.
Tire	Steel		7 $\frac{1}{2}$ inch.
Bolts at joints.	Norway iron.	Tire	1 $\frac{1}{2}$ inch.
Screws			3 $\frac{1}{2}$ inch No. 8.
Step pads.	Norway iron.	Square.	3x3 $\frac{1}{2}$ inch.
Branches	B. B. iron	Oval	7x7 $\frac{1}{2}$ inch.
Bolts	Norway iron.		1 $\frac{1}{2}$ inch.
Dash, light.			13 inches.
Main and bottom bars.	Low Moor iron	Oval	2x4 inch.
Other bars.	Low Moor iron	Oval	3x4 inch.
Heels	Norway iron		4x3 $\frac{1}{2}$ inch.
Foot rod.	B. B. iron	Half oval	3 $\frac{1}{2}$ inch.
Seat stay.	Burden's iron	Oval	3x7 $\frac{1}{2}$ inch.
Wear iron.	Steel		4 $\frac{1}{2}$ inches long.
Shifting rail.	Norway iron	Oval	7x7 $\frac{1}{2}$ inch.
Side and hack stays.	Norway iron	Round.	1 $\frac{1}{2}$ inch.
Stump joints, long.	Norway iron		5 $\frac{1}{2}$ inch.
Piece part.	Burden's iron	Oval	5x7 $\frac{1}{2}$ inch.
Short	Norway iron		1 $\frac{1}{2}$ inch.
Piece part.	Burden's iron	Oval.	7x7 $\frac{1}{2}$ inch.
Seat handles.		Round.	3 $\frac{1}{2}$ inch.

BLACKSMITH COAL.

There are three kinds of coal that can be used in the blacksmith shop—anthracite, bituminous and charcoal. The latter is superior to the other kinds, as regards its effect upon the metals, but it is the most expensive of any, besides requiring more time to produce fusion, and is otherwise objectionable because of the bulk necessary to keep the fire up to the required heat. Anthracite coal, being hard and coarse, does not lie sufficiently close to give a good, even fire; the softer qualities, such as the Lackawanna, have been used with some success, but it lacked one quality which is an almost indispensable one in the blacksmith's fire—that of incrustation, without which much of the heat is lost. Bituminous coal is without doubt the most desirable of all; its minute particles admit of almost instant adhesion, and when heat up to 300 or 400 degrees Fahrenheit, a crust forms which retains the gases until they are burnt, leaving a body of coke upon which the fire can feed.

All bituminous coals, however, are not adapted to the forge; the cannel and gas coals contain too much volatile matter and are therefore almost useless. The best coal in this country, if not in the world, is undoubtedly in Cumberland; it possesses in a wonderful degree all the desirable qualities, and is remarkably free from extraneous matter.

No. 3.

**Table of Kinds and Sizes of Iron Used in Ironing a Top Buggy, Weight about 300 Pounds.
Track 4 feet 8 inches.**

Sectional Parts.	Metal.	Shape.	Size.
Axles, nut.....	Steel	Plain taper	7x6 $\frac{1}{2}$ inches.
Piece part.....	Low Moor iron	Bar	3x1 $\frac{1}{8}$ inches.
Length.....			3 feet 8 inches.
Springs, three plates.....	Swedes steel.	Elliptic spear point top plates, square ends on bottom plates, but- ton heads.	1 $\frac{1}{4}$ inches.
Front length.....			32 inches.
Open.....			8 inches.
Main and second plates.....			No. 4.
Additional plates.....			No. 5.
Back, length.....			32 inches.
Open.....			8 $\frac{1}{2}$ inches.
Main plate.....			No. 3.
Additional plates.....			No. 4.
Fifth wheel.....	Norway iron		12 inches.
Fifth wheel at bearings.....			7 $\frac{1}{8}$ inch.
Shaft iron heads.....	Burden's iron		1 $\frac{1}{4}$ inches.
Bolts.....	Norway iron	Square heads	7 $\frac{1}{8}$ inch.
Ears of jack clips.....	Norway iron		7 $\frac{1}{8}$ inch.
Shaft irons.....	Burden's iron	Flat oval	1 $\frac{1}{4}$ x $\frac{1}{8}$ inch.
Bolts.....	Norway iron	Steeple heads	1 inch.
Jack clips.....	Norway iron	Flat	1 inch.
Screw ends.....	Norway iron	Round	7 $\frac{1}{8}$ inch.
Additional clips.....	Norway iron	Flat	7 $\frac{1}{8}$ inch.
Screw ends.....	Norway iron	Round	1 inch.
Perch plate ends.....	Norway iron	Bar	3 $\frac{1}{2}$ x1 $\frac{1}{4}$ inch.
Center.....	Ulster iron	Flat	3 $\frac{1}{2}$ x $\frac{1}{8}$ inch.
Bolts.....	Norway iron	Steeple heads	7 $\frac{1}{8}$ inch.
Side stays.....	Low Moor iron	Oval	1 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Ends at heels.....	Norway iron	Square	1 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Head block bolt.....	Norway iron	Turned heads	7 $\frac{1}{8}$ inch.
Bolts at stay branch.....	Norway iron	Turned heads	1 inch.
Bolts for front ends.....	Norway iron	Turned heads	7 $\frac{1}{8}$ inch.
Spring and spring bar clips.....	Norway iron	Flat	7 $\frac{1}{8}$ inch.
Ends.....	Norway iron	Round	7 $\frac{1}{8}$ inch.
Clip king bolt at head plate.....	Norway iron	Round	7 $\frac{1}{8}$ inch.
Spring section.....	Norway iron	Round	3 $\frac{1}{8}$ inch.
Body loops.....	Burden's iron	Oval	1x1 $\frac{1}{2}$ inch.
At head.....		Oval	3 $\frac{1}{4}$ x $\frac{3}{8}$ inch.
Head.....		Round	7 $\frac{1}{8}$ x $\frac{7}{8}$ inch.
Center piece.....	Best strap iron	Flat	7 $\frac{1}{8}$ x1 inch.
Bolts for heads.....	Norway iron	Steeple heads	7 $\frac{1}{8}$ inch.
Bolts at butts.....	Norway iron	Turned heads	1 inch.
Screw for center piece.....			1 inch No. 12.
Tire.....	Steel	Flat	7 $\frac{1}{8}$ x $\frac{1}{8}$ inch.
Bolts.....	Norway iron	Tire	7 $\frac{1}{8}$ inch.
Step pads, main.....	Norway iron	Flat jagged	3 $\frac{1}{4}$ x3 $\frac{1}{2}$ inches.
Shank.....	Burden's iron	Oval	3 $\frac{1}{8}$ x $\frac{5}{8}$ inch.
Pads, top.....	Norway iron	Flat jagged	3x3 $\frac{1}{4}$ inches.
Shank.....	Burden's iron	Oval	3 $\frac{1}{8}$ x $\frac{5}{8}$ inch.
Dash, light.....			10 inches.
Main and bottom bars.....	Low Moor iron	Oval	1 $\frac{1}{2}$ x $\frac{1}{8}$ inch.
Top and center bars.....	Low Moor iron	Oval	1 $\frac{1}{2}$ x $\frac{1}{4}$ inch.
Foot rod.....	Burden's iron	Oval	5 $\frac{1}{8}$ x $\frac{3}{8}$ inch.
Stump joints, bottom prop.....	Low Moor iron		1 $\frac{1}{2}$ x $\frac{5}{8}$ inch.
Piece part.....	Norway iron	Oval	3 $\frac{1}{8}$ x $\frac{5}{8}$ inch.
Front prop.....	Low Moor iron		3 $\frac{1}{8}$ x $\frac{1}{2}$ inch.
Piece part.....	Norway iron	Oval	3 $\frac{1}{8}$ x $\frac{1}{2}$ inch.
Hub bands.....	Norway iron	Central Park	2x $\frac{1}{8}$ inch.
Felloe plates.....	Norway iron		
Slat irons, four-bow.....	Norway iron	New York pattern	
Shifting rail.....	Norway iron	Round	3 $\frac{1}{8}$ and $\frac{1}{2}$ inch.

FILES.

The file comes next to the hammer in importance in the blacksmith shop, and how to use it so as to secure the greatest wear and the most work is an important pecuniary consideration. Manufacturers in too many cases do not view this subject in a proper light. Some adopt the rule to give out new files at stated intervals, while others refuse them so long as those in use can be made to cut. Neither custom is to be commended. A skillful man will perform much more work than an unskillful one in a given period. One man may be able to perform as much work in two days as another will in four, and in the two days the file is worn out. An inexperienced workman can destroy a file in a day and not do but little work. There is therefore no rule to follow but the one, to substitute an new for an old as soon as the file becomes worn.

The finishers' bench should be provided with a variety of files. The following gives a good assortment. One 17-inch flat bastard for "roughing," one 14-inch flat bastard, and one 13-inch half round bastard, each worn for scaling. One flat bastard and one half round bastard, same lengths as those worn, for use as soon as scales, etc., are removed. One 8-inch flat bastard for fitting. One 8-inch and one 10-inch square bastard, and one 8-inch and one 10-inch round bastard for truing up bolt holes. One 12-inch float for filing drills; one 6-inch round for sharpening wood boring tools. In addition to these there should be a rack of small round, square, half round and three corner files for special uses. The roughing files should be those that have been used in the woodshop until the sharp burs are worn off.

In addition to these there should be a hot iron file. This should be 24 inches long and about 1 $\frac{1}{2}$ inches wide, both faces flat, one edge round, the other square. This is for use at points where the swage or cold chisel cannot be used.

No. 4.

Table of Kinds and Sizes of Iron Used in Constructing a Pony Phaeton on Two Springs, 4 Feet 8 Inch or 4 Feet 10 Inch Trunk.

Sectional Parts.	Metal.	Shape.	Size.
Axles	Steel	Nat.	1x6 $\frac{1}{2}$ inches.
Piece part, front	Burden's iron		1 $\frac{1}{4}$ x $\frac{3}{4}$ inch.
Piece part, back			1 $\frac{1}{2}$ x $\frac{7}{8}$ inch.
Springs, front, four plates	Oil temper, Swedes	Elliptic, square ends; button heads.	1 $\frac{3}{8}$ inches.
Length			36 inches.
Open			7 inches.
Main and second plates			No. 3.
Additional plates			No. 4.
Back, five plates			1 $\frac{1}{2}$ steel.
Length			37 inches.
Open			9 $\frac{1}{2}$ inches.
Main plates			No. 2.
Second and third plates			No. 3.
Additional plates			No. 4.
Fifth wheel		Half circle	15 inches.
Circles	Norway iron	Half round	1x $\frac{1}{2}$ inch.
Bolts	Norway iron		$\frac{1}{4}$ inch.
Shaft irons	Ulster iron	Flat half oval	1 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Jacks		Plain	1 $\frac{1}{8}$ inches.
Bolts	Norway iron		$\frac{1}{4}$ inch.
Perch plate, front end	Norway iron		1 $\frac{1}{4}$ x $\frac{7}{8}$ inch.
Back end	Norway iron		
Bolts	Norway iron		$\frac{5}{8}$ inch.
Center	Ulster iron	Flat	1 $\frac{1}{4}$ x $\frac{1}{4}$ inch.
Top plate	Norway iron	Half oval	1x $\frac{7}{8}$ inch.
Side stays	Burden's iron		
Outside and inner back branch		Oval	$\frac{5}{8}$ x $\frac{3}{8}$ inch.
Inner front branch		Oval	$\frac{5}{8}$ x $\frac{1}{2}$ inch.
Heels	Norway iron		
Body loops	Ulster iron		
Front		Square	$\frac{7}{8}$ inch.
At butt		Oval	$\frac{7}{8}$ x $\frac{5}{8}$ inch.
At bar		Oval	$\frac{3}{4}$ x $\frac{1}{2}$ inch.
Head			$\frac{7}{8}$ inch.
Back		Square	1 inch.
At butt		Oval	1 $\frac{1}{8}$ x $\frac{7}{8}$ inch.
At bar		Oval	1x $\frac{1}{2}$ inch.
Head			$\frac{7}{8}$ inch.
Bolts	Norway iron		$\frac{1}{2}$ inch.
Clip king bolt	Norway iron		$\frac{3}{4}$ inch.
Spring portion			$\frac{1}{2}$ inch.
Clips	Norway iron	Flat	$\frac{7}{8}$ inch.
Ends			$\frac{3}{8}$ inch.
Tire	Steel		1x $\frac{3}{4}$ inch.
Tire	Compound iron		1 $\frac{1}{8}$ x $\frac{3}{8}$ inch.
Tire	Iron		1 $\frac{1}{8}$ x $\frac{1}{4}$ inch.
Bolts		Tire	$\frac{3}{8}$ inch.
Step	Norway iron	Gridiron	4 $\frac{1}{2}$ x5 $\frac{1}{2}$ inches.
Branches	Burden's iron	Oval	3 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Bolts	Norway iron		$\frac{1}{2}$ inch.
Dash			15 inches high.
End and bottom bars	Ulster iron	Oval	3 $\frac{1}{4}$ x $\frac{3}{4}$ inch.
Center, top and end bars	Ulster iron	Oval	$\frac{5}{8}$ x $\frac{3}{8}$ inch.
Feet	Norway iron		
Foot rod	Ulster iron	Oval	3 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Lining to top of basket	Band iron		$\frac{3}{4}$ inch No. 14.
Joints, back	Norway iron	Stump joint	3 $\frac{1}{4}$ x $\frac{5}{8}$ inch.
Piece part	B. B. iron	Oval	$\frac{5}{8}$ x $\frac{1}{2}$ inch.
Front	Norway iron	Stump joint	$\frac{5}{8}$ x $\frac{5}{8}$ inch.
Piece part	B. B. iron	Oval	$\frac{5}{8}$ x $\frac{3}{8}$ inch.
Rocker plates	L. W. iron		1 $\frac{1}{2}$ x $\frac{1}{2}$ inch.
Screws			No. 14.
Spring bar bolts	Norway iron		$\frac{3}{8}$ inch.

TONGS.

The blacksmiths' tong-rack should be well stored with tongs. To hold the iron well it is necessary that the jaws take a full hold, beginning with the closest there should be two pairs $\frac{1}{4}$ of an inch open, two of $\frac{1}{2}$ inch, two of $\frac{3}{4}$, two of $\frac{1}{2}$ inch, and one for each $\frac{1}{4}$ of an inch up to 1 inch, and one pair for each $\frac{1}{4}$ of an inch above that size. This will obviate the necessity of the blacksmith occasionally heating the jaws of his tongs and adjusting them to the piece of iron to be held. The firmer the jaws clench the iron the easier is it to hold it. Every blacksmith knows that the hand that holds the tongs is tired at night than the one that holds the hammer. This is due to the strain from a tight grip. To make the tongs grip the iron more firmly some blacksmiths rough the face of the jaws. If the tongs are of the proper size this is entirely unnecessary.

Tongs should be made of hard iron, such as Low Moor, Ulster or Burdens. The soft irons are not sufficiently rigid to sustain the strain without bending. Drill the rivet holes instead of punching them. If the jaws work loose heat the rivets and lighten upon the forge, then return the tongs to the fire, heat them red and open and close them until they work easy.

No. 5.

Table of Kinds and Sizes of Iron Used in Constructing a Pony Phaeton, perch carriage, three springs, 4 feet 10 inch Track.

Sectional Parts.	Metal.	Shape.	Size.
Axle, front.....	Steel	Plain taper	7 $\frac{1}{2}$ x6 $\frac{1}{2}$ inch.
Piece part, front.....	Burden's iron		1 $\frac{1}{4}$ x1 inch.
Back.....	Steel	Plain taper	1x6 $\frac{1}{2}$ inches.
Piece part, back.....	Burden's iron		1 $\frac{1}{4}$ x1 $\frac{1}{2}$ inches
Springs, elliptic.....			1 $\frac{1}{4}$ inches.
Front.....			3 plates.
Length.....			37 inches.
Open.....			8 inches.
Main plate.....	Swedes steel, oil temper.	Elliptics; button heads; top plates spear points; bottom plates oval points.	No. 3.
Additional plates.....			No. 4.
Back.....			4 plates.
Length.....			35 inches.
Open.....			8 inches.
Main and second plates.....			No. 3.
Additional plates.....			No. 4.
Fifth wheel.....	Norway iron		15 inches.
Plates.....		Half round	1x $\frac{1}{2}$ inch.
Bolts.....	Norway iron		
Perch plate, head portion.....	Norway iron		1 $\frac{1}{4}$ x3 $\frac{3}{8}$ inches.
Back end.....	Norway iron		1 $\frac{1}{4}$ x3 $\frac{3}{8}$ inches.
Center.....	Burden's iron	Swaged	1 $\frac{1}{4}$ x $\frac{1}{4}$ inches.
Back plate clip.....	Norway iron	Half oval	1 $\frac{1}{4}$ x $\frac{1}{4}$ inches.
Bolt part.....			3 $\frac{3}{8}$ inch.
Strap, wide.....			1 $\frac{1}{2}$ inches.
Spring clips.....	Norway iron		$\frac{1}{8}$ inch thick
Stay portion.....	Low Moor iron	Oval	7 $\frac{1}{2}$ x $\frac{1}{2}$ inch.
Head block stay.....	Norway iron	Half oval	1x $\frac{1}{8}$ inch.
Shaft irons.....	Burden's iron		13 $\frac{1}{2}$ x $\frac{1}{8}$ inches.
Length on bar.....			8 inches.
Length front of bar.....			10 inches.
Goose neck at shaft end.....		Oval	1 $\frac{1}{4}$ x3 $\frac{3}{8}$ inches
At head.....		Oval	7 $\frac{1}{2}$ x $\frac{3}{8}$ inch.
Head.....			13 $\frac{1}{2}$ inch.
Jack.....	Norway iron	Plain pattern	
Bolt.....			7 $\frac{1}{8}$ inches.
Pole plate to T.....	Norway iron		1 $\frac{1}{4}$ x $\frac{1}{8}$ inches.
Piece out with.....	Burden's iron	Half oval	7 $\frac{1}{2}$ x $\frac{1}{8}$ inch.
Top plate.....	Norway iron		12 inches long.
Goose necks.....	Low Moor iron	Round	3 $\frac{1}{4}$ inch.
At head.....			5 $\frac{1}{8}$ inch.
Side stays.....	Low Moor iron	Oval	3 $\frac{1}{4}$ x $\frac{1}{8}$ inch.
Body loops.....	Burden's iron	Square	7 $\frac{1}{8}$ inch.
At head.....		Oval	3 $\frac{1}{4}$ inch.
Head.....			7 $\frac{1}{8}$ inch.
Bolts.....	Norway iron		3 $\frac{1}{8}$ inch.
For body.....	Norway iron		$\frac{1}{8}$ inch.
Brakes or back loops.....	Low Moor iron	Full oal.	1 $\frac{1}{2}$ x1 inch.
Taper end, back spring flange.....			3 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Clip king bolt.....	Norway iron		3 $\frac{1}{4}$ inch.
Spring portion.....			1 $\frac{1}{8}$ inch.
Clips.....	Norway iron	Flat	1 inch.
Ends.....			3 $\frac{1}{8}$ inch.
Tire.....	Iron		1 $\frac{1}{2}$ x $\frac{1}{8}$ inches.
Tire.....	Compound iron		1 $\frac{1}{2}$ x $\frac{1}{4}$ inches.
Tire.....	Steel		1 $\frac{1}{2}$ x $\frac{1}{8}$ inches.
Bolts.....	Norway iron	Tire	$\frac{1}{8}$ or $\frac{1}{4}$ inch.
Spring bolts.....	Norway iron		3 $\frac{1}{8}$ inch.
Step pad.....		Gridiron	4x5 inches.
Shank.....	Burden's iron		3 $\frac{1}{4}$ inch.
At pad.....		Round	3 $\frac{1}{8}$ inch.
Branches.....	Low Moor iron	Oval	3 $\frac{1}{4}$ x3 $\frac{3}{8}$ inch.
Foot rod.....	Common iron	Oval	7 $\frac{1}{2}$ x $\frac{1}{8}$ inch.
Rail to rumble seat.....	Burden's iron	Round	3 $\frac{1}{8}$ inch.
Pad to rumble seat.....			4x1 $\frac{1}{2}$ inches.
Shank.....	Low Moor iron	Oval	1x3 $\frac{1}{4}$ inch.
Dash, light.....			20 inches.
Project at ends.....			5 inches.
Section wing, length.....			12 inches.
Bottom and heel bars.....	Low Moor iron	Oval	3 $\frac{1}{4}$ x3 $\frac{3}{8}$ inch.
All other bars.....	Low Moor iron	Oval	5 $\frac{1}{2}$ x3 $\frac{3}{8}$ inch.
Heels.....	Norway iron		
Rocker plates.....	Burden's iron		13 $\frac{1}{4}$ x $\frac{1}{4}$ inches.
Screws.....			No. 14.

COLD CHISELS.

The cold chisel, if properly made, is a valuable and a labor saving tool; with it ridges and thick parts may be cut away in less than half the time that it could be done with a file. A perfect chisel should be wedge shape, at an angle that would give $\frac{1}{16}$ of an inch at the lower end and $\frac{3}{8}$ of an inch at a point $1\frac{1}{2}$ inches above; draw the taper perfectly true and file off the end square and grind each edge to give a bevel of $\frac{1}{8}$ of an inch; the temper must be made to suit the article to be cut, it will not do to use the one chisel on all kinds of metal. A chisel that would work well on steel or hard iron would be likely to break if used on soft metals, while the one that would work the best on soft metals would be too soft to cut the hard metals.

No. 6.

Table of the Kinds and Sizes of Iron Used in Constructing a Pony Phaeton With Kumble, Upon Platform Coupe Futchel Carriage; Track, 4 Feet 8 Inches, or 4 Feet 10 Inches.

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened iron.....	Nut or mail.....	1x6 ¹ / ₂ inches.
Piece part.....	Low Moor iron.....		1x1 ¹ / ₈ inches.
Springs.....			1 ¹ / ₄ x1 ¹ / ₂ inches.
Front.....			3 plates.
Length.....			30 inches.
Open.....			6 inches.
All plates.....			No. 3.
Back.....	Swedcs steel, oil temper.	Full elliptics, button heads; square ends to plates; ends to top plates long beveled.	4 plates.
Length.....			36 inches.
Open.....			7 inches.
Main plate.....			No. 2.
Second and third plates.....			No. 3.
Fourth.....			No. 4.
If 1 ¹ / ₄ inch steel is preferred, all plates.....			No. 3.
Fifth wheel.....	Ulster iron.....	Half circle.....	1x ¹ / ₄ inch.
Bottom bed, bottom plate.....		Half round.....	1 ¹ / ₄ x ⁵ / ₈ inch.
Bottom bed, top plate.....	Common iron.....	Half oval.....	3 ⁴ / ₈ x ⁷ / ₈ inch.
Top bed, top plate.....	Norway iron.....	Half round.....	7 ⁵ / ₈ x1 ¹ / ₂ inch.
Socket plate.....	Norway iron.....	Half oval.....	1x ³ / ₈ inch.
Back bar, top carriage.....	Low Moor iron.....	Full oval.....	1x ⁵ / ₈ inch.
Bottom socket.....	Norway iron.....	Half oval.....	1x ³ / ₄ inch.
Bottom plate of futchels.....	Burden's iron.....		6 ⁵ / ₈ inch.
Back end.....			6 ⁵ / ₈ x ³ / ₈ inch.
Front end.....	Common iron.....	Half oval.....	1x ³ / ₈ inch.
Inside plate of futchels.....	Common iron.....	Half oval.....	1x ³ / ₈ inch.
Front ends.....	Norway iron.....		
Side stay.....	Burden's iron.....		1 ¹ / ₄ x ⁵ / ₈ inch.
Ends.....		Round.....	⁵ / ₈ inch.
King bolt.....	Norway iron.....		1 ¹ / ₂ inch.
Trace knobs.....		Round heads.....	2 inches.
Pole socket.....			2 ¹ / ₄ x2 inches.
Draw bar, bottom plate.....	Norway iron.....	Flat half oval.....	1 ¹ / ₄ x ⁷ / ₈ inch.
Bolts.....	Norway iron.....		1 ¹ / ₄ inch.
Box clips.....	Burden's iron.....		1 ¹ / ₄ x ⁷ / ₈ inch.
Bottom plate for shafts.....	Norway iron.....	Half oval.....	1x ⁷ / ₈ inch.
Front loops to body.....	Burden's iron.....	Swaged.....	1 ¹ / ₄ inch.
Front ends.....		Oval.....	1x ³ / ₄ inch.
Bolts.....	Norway iron.....		³ / ₈ inch.
Dash, light.....			22 inches.
Main and bottom bars.....	Norway iron.....	Oval.....	3 ⁵ / ₈ x ³ / ₄ inch.
Additional bars.....	Norway iron.....	Oval.....	5 ⁵ / ₈ x ³ / ₈ inch.
Rein roll.....	Norway iron.....	Round.....	³ / ₈ inch.
Bolts.....	Norway iron.....		⁷ / ₈ inch.
Back wings.....	Norway iron.....	Oval.....	5 ⁵ / ₈ x ³ / ₈ inch.
Brakes.....	Low Moor iron.....	Full oval.....	1x1 ¹ / ₈ inches.
Flange for rumble irons.....			3 ⁴ / ₈ x1 ¹ / ₂ inch.
Rail to rumble seat.....	Ulster iron.....	Round.....	³ / ₈ inch.
Step pads.....	Sheet iron.....		No. 10.
Tread.....		Oval.....	6x10 inches.
Shank.....	Ulster iron.....	Octagon.....	⁷ / ₈ inch.
Bolts.....	Norway iron.....		⁷ / ₈ inch.
Tire.....	Common iron.....		1 ¹ / ₈ x ⁵ / ₈ inch.
Tire.....	Low Moor iron.....		1 ¹ / ₈ x ¹ / ₄ inches.
Tire.....	Steel.....		1 ¹ / ₈ x ⁷ / ₈ inch.
Bolts.....	Norway iron.....	Tire.....	⁵ / ₈ inch.
Rumble step pad.....	Sheet iron.....		4x4 ¹ / ₂ inches.
Shank.....	Low Moor iron.....	Swaged.....	1x ³ / ₄ inches.
Rocker plates.....	Burden's iron.....		1 ³ / ₄ x1 ¹ / ₄ inch.
Screws.....			No. 14.
Hub bands.....	Band iron.....		1 ¹ / ₈ inch.

BRAZING.

Brazing is a simple process, but one that requires care. The article to be brazed must be cleaned thoroughly at the joint, and the edges brought well together, then place the brazing material over the joint; moisten borax in water and place a quantity along the joint; hold the piece over a good charcoal or a clean hard coal fire until the brazing material is melted, jar it slightly to cause it to enter the joint; as soon as melted remove from the fire; if the article brazed is brass or copper plunge it in cold water, if iron, allow it to cool slowly. In brazing brass use silver, for iron or steel thin strips of spelter or sheet brass.

MOLTEN LEAD FOR TEMPERING.

The use of molten lead for tempering was for a long time kept as a secret by the discoverer. Its uses are, however, not confined to the tool maker; delicate tools can be heat all parts alike by being put into the boiling lead, their heat not exceeding that of the lead. It is sometimes desirable to anneal a portion of an article that has been tempered, this can be done without drawing the temper at other points by dipping the part to be annealed in hot lead; it acts equally well with all metals and should be ever present on the blacksmiths' forge.

No. 7.

Table of Kinds and Sizes of Iron Used in Constructing a Doctor's Phaeton Weighing About 450 Pounds.

<i>Sectional Parts.</i>	<i>Metal.</i>	<i>Shape.</i>	<i>Size.</i>
Axles, nut.....	Case hardened	Plain taper.....	1 $\frac{1}{2}$ x7 inches.
Piece part.....	Burden's iron	Square.....	1x1 $\frac{1}{4}$ inch.
Springs, four plates.....	Swedes steel	Elliptic, round point	1 $\frac{1}{2}$ inches.
Front, length.....			37 inches.
Open.....			8 $\frac{1}{2}$ inches.
Main and second plates.....			No. 3.
Additional plates.....			No. 4.
Back, length.....			39 inches.
Open.....			10 inches.
Plates.....			No. 4.
Fifth wheel.....	Norway iron	Half circle.....	16 inches.
Fifth wheel at bearing.....			1 inch.
Shaft iron heads.....	Burden's iron		1 $\frac{1}{2}$ inches.
Bolts.....	Norway iron	Cone head.....	1 $\frac{1}{2}$ inch.
Ears of jack clips, thick.....	Norway iron		1 $\frac{1}{2}$ inch.
Shaft irons.....	Burden's iron	Flat oval.....	1 $\frac{3}{8}$ x $\frac{7}{8}$ inch.
Bolts.....	Norway iron	Turned heads.....	$\frac{3}{8}$ inch.
Jack clips.....	Norway iron	Flat.....	1 $\frac{1}{2}$ inches.
Screw end.....	Norway iron	Round.....	$\frac{3}{8}$ inch.
Axle clips.....	Norway iron	Flat.....	1 $\frac{1}{4}$ inches.
Screw ends.....	Norway iron	Round.....	$\frac{5}{8}$ inch.
Perch plate, bottom, ends.....	Norway iron	Flat.....	$\frac{7}{8}$ x1 $\frac{1}{4}$ inches.
Perch plate, bottom, center.....	Ulster iron	Flat.....	$\frac{7}{8}$ x1 $\frac{1}{4}$ inches.
Perch plate, top.....	Norway iron	Flat.....	$\frac{7}{8}$ x $\frac{5}{8}$ inch.
Perch plate, swaged.....		Half oval.....	1 inch.
Perch bolt.....	Norway iron	Cone head.....	$\frac{1}{2}$ inch.
Side stays, main.....	Burden's iron	Oval.....	$\frac{7}{8}$ x $\frac{3}{4}$ inch.
Side stays, inside.....	Burden's iron	Oval.....	$\frac{3}{8}$ x $\frac{3}{8}$ inch.
Side stays, ends at heels.....	Norway iron	Flat.....	$\frac{3}{4}$ inch.
Bolts at head block.....	Norway iron	Cone heads.....	$\frac{7}{8}$ inch.
Bolts at branch of stays.....	Norway iron	Flat heads.....	$\frac{3}{8}$ inch.
Bolts for front end.....	Norway iron	Flat heads.....	$\frac{1}{4}$ inch.
Spring and spring bar clips.....	Norway iron	Flat.....	1 inch.
Ends.....	Norway iron	Round.....	$\frac{3}{8}$ inch.
Clip king bolt.....	Norway iron		No. 3.
At head plate.....		Round.....	$\frac{5}{8}$ inch.
Spring section.....		Round.....	$\frac{1}{2}$ inch.
Boss to fifth wheel stay.....	Norway iron	Round.....	$\frac{3}{4}$ inch.
Body loops, front.....	Burden's iron	Oval.....	1 inch.
Back.....	Burden's iron	Oval.....	1 $\frac{1}{8}$ inches.
Head at base.....			1 $\frac{3}{8}$ inch.
Bolts for heads.....	Norway iron	Cone heads.....	$\frac{7}{8}$ inch.
Bolts at butts.....	Norway iron	Round heads.....	$\frac{3}{8}$ inch.
Additional bolts.....	Norway iron	Round heads.....	$\frac{1}{2}$ inch.
Tire.....	Compound iron		1 $\frac{1}{4}$ x $\frac{7}{8}$ inch.
Tire.....	Steel		1 $\frac{1}{4}$ x1 $\frac{1}{4}$ inch.
Tire bolts.....	Norway iron	Tire.....	$\frac{1}{4}$ inch.
Step pads.....	Norway iron	Gridiron.....	4 $\frac{1}{2}$ x5 inches.
Shanks.....	Ulster iron	Octagon and round.....	$\frac{3}{4}$ inch.
Dash.....	B. B. iron	Oval.....	16 inches high.
Dash, outside and top bars.....	B. B. iron	Oval.....	3 $\frac{1}{4}$ x $\frac{7}{8}$ inch.
Dash, inner bars and handles.....	B. B. iron	Oval.....	3 $\frac{1}{8}$ x $\frac{3}{8}$ inch.
Foot rod.....	Ulster iron	Oval.....	1 $\frac{1}{2}$ x $\frac{7}{8}$ inch.
Stump joints, bottom prop.....	B. B. iron		3 $\frac{1}{8}$ x $\frac{7}{8}$ inch.
Piece part.....	Norway iron	Oval.....	1 $\frac{1}{2}$ x $\frac{7}{8}$ inch.
Front prop.....	B. B. iron		1 $\frac{1}{2}$ x $\frac{3}{4}$ inch.
Piece part.....	Norway iron	Oval.....	3 $\frac{1}{8}$ x $\frac{3}{4}$ inch.
Hub bands.....		Band.....	$\frac{3}{8}$ x2 inches.
Rocker plates.....	L. W. iron	Flat.....	3 $\frac{1}{8}$ x2 inches.
Screws.....			No. 16.

DRILLING IRON.

Wherever it is possible, it is best to drill holes through the iron; the process is not a tedious one, if almost any one of the power drills in the market are employed and twist drills used. Drillery cuts the metal away in such small particles that no damage is done, whereas the punch is liable to produce fractures. If square holes are desired, drill and then file out with a square file.

CARE OF THE BELLOWS.

A well-made bellows should last twenty-five years, if well treated, but it is doubtful if one out of twenty lasts ten years, without a great deal of patching. The constant working of the bellows produces friction which tends to wear away the leather, but much of this may be obviated by keeping it clean; if well dusted daily, its wearing qualities will be greatly increased.

TO TEMPER CUTTING TOOLS.

Heavy cutting tools, like axes, can be tempered so as to carry a keen, strong edge by heating to a red heat and running it down to a blue in warm rain water. If very heavy heat and cool twice.

No. 8.

**Table of Kinds and Sizes of Irons Used in Constructing a Four-Seat Rockaway, Shifting Front,
4 feet 10 inch Track.**

Sectional Parts.	Metal.	Shape.	Size.
Axles, nut.....	Iron, case hardened.	Plain taper.....	1 $\frac{1}{2}$ x7 inches.
Piece part, back.....	Low Moor iron.....	Bar.....	1x1 $\frac{1}{2}$ inches.
Piece part, front.....	Low Moor iron.....	Bar.....	1x1 $\frac{3}{8}$ inches.
Springs, five plates.....	Swedes steel.	Elliptic, round points to top plates, and square points to bot- tom plates, French clips, front 1 $\frac{3}{8}$, back 1 $\frac{1}{2}$.	1 $\frac{3}{8}$ and 1 $\frac{1}{2}$ inches.
Front, length.....			37 inches.
Open.....			No. 2.
Main plate.....			No. 3.
Second and third plates.....			No. 4.
Fourth and fifth plates.....			39 inches.
Back, length.....			9 $\frac{1}{2}$ inches.
Open.....			No. 2.
Main and second plates.....			No. 3.
Additional plates.....			15 inches.
Fifth wheel.....	Norway iron.....		1 inch.
Circles.....	Norway iron.....	Half round.....	$\frac{1}{2}$ inch.
Bolts.....	Norway iron.....		1 $\frac{1}{2}$ x1 $\frac{3}{8}$ inch.
Shaft irons.....	Burden's iron.....	Swaged.....	14 inches.
Length front of bar.....			10 inches.
Length on bar.....			$\frac{1}{2}$ inch.
Bolts.....	Norway iron.....		
Jacks.....	Norway iron.....	Plain.....	1 $\frac{1}{4}$ inch.
Heads, long.....	Norway iron.....	Round.....	$\frac{7}{8}$ inch.
Bolts.....	Norway iron.....	Turned heads.....	1 inch.
Clips.....	Norway iron.....	Strap.....	$\frac{1}{2}$ inch.
Bolt end.....		Round.....	$\frac{1}{2}$ inch.
Perch plate, bottom end.....	Norway iron.....	Flat.....	$\frac{3}{8}$ x1 $\frac{1}{4}$ inch.
Center.....	Burden's iron.....	Flat.....	$\frac{3}{8}$ x1 $\frac{1}{4}$ inch.
Top.....	Norway iron.....	Half oval.....	1 $\frac{1}{8}$ x $\frac{7}{8}$ inch.
Bolts.....	Norway iron.....	Turned heads.....	$\frac{1}{2}$ inch.
Head plates.....	Norway iron.....	Half oval.....	1 $\frac{1}{8}$ x $\frac{7}{8}$ inch.
Side stays, outside and back.....	Low Moor iron.....	Oval.....	$\frac{3}{8}$ x $\frac{5}{8}$ inch.
Front branch.....	Low Moor iron.....	Oval.....	$\frac{1}{2}$ x $\frac{5}{8}$ inch.
Ends at head block.....	Norway iron.....	Half oval.....	1x1 $\frac{1}{4}$ inch.
Bolts.....	Norway iron.....	Turned heads.....	$\frac{1}{2}$ inch.
Spring bar bolts.....	Norway iron.....	Turned heads.....	$\frac{3}{8}$ inch.
Clip king bolt.....	Norway iron.....	Plain.....	1 inch.
Bolt part.....	Norway iron.....	Round.....	$\frac{3}{4}$ inch.
Body loops, back.....	Low Moor iron.....	Swaged.....	$\frac{7}{8}$ x1 $\frac{1}{8}$ inch.
Heads at loops.....	Low Moor iron.....	Round.....	1 inch.
Bolts.....	Norway iron.....	Turned heads.....	$\frac{3}{8}$ inch.
Tire.....	Common iron.....	Flat.....	$\frac{1}{2}$ x $\frac{1}{4}$ inch.
Tire.....	Compound iron.....	Flat.....	$\frac{1}{2}$ x1 $\frac{1}{4}$ inch.
Tire.....	Steel.....	Flat.....	$\frac{1}{2}$ x1 $\frac{1}{4}$ inch.
Bolts.....	Norway iron.....	Tire.....	$\frac{1}{2}$ inch.
Step pad without covers.....	Norway iron.....	Square.....	6 $\frac{1}{2}$ x8 inches.
Main branch.....	Burden's iron.....	Octagon and square.....	$\frac{7}{8}$ inch.
At pad.....		Oval.....	1 $\frac{1}{2}$ x $\frac{3}{4}$ inch.
Pad, if cover is used.....	Sheet iron, No. 10.....	Horseshoe.....	5 $\frac{1}{2}$ x7 inches.
Back straps.....	Burden's iron.....	Oval.....	$\frac{3}{8}$ x $\frac{3}{4}$ inch.
Bolts.....	Norway iron.....	Turned heads.....	$\frac{3}{8}$ inch.
Cover.....	Sheet iron, No. 14.....	Horseshoe.....	6 $\frac{1}{2}$ x8 inches.
Dash, light.....			15 inches.
Bars.....	Low Moor iron.....	Oval.....	$\frac{3}{8}$ x $\frac{3}{4}$ inch.
Foot rod.....	Burden's iron.....	Oval.....	$\frac{3}{4}$ x $\frac{3}{8}$ inch.
Hub bands, wrought.....	Norway iron.....	Plain.....	$\frac{1}{8}$ inch thick.
Side rail to front seat.....	Burden's iron.....	Round.....	$\frac{1}{2}$ inch.
Railroad back uprights.....	Ulster iron.....	Oval.....	1 $\frac{1}{2}$ x $\frac{7}{8}$ inch.
Bottom.....	Ulster iron.....	Half oval.....	1 $\frac{1}{8}$ inch.
Bolt.....	Norway iron.....	Flat head.....	$\frac{7}{8}$ inch.
Height.....			15 inches.
Arch plates.....	Ulster iron.....	Half oval.....	1 $\frac{1}{2}$ x $\frac{3}{4}$ inch.

WORKING STEEL.

Steel to be forged must be heat evenly and as quickly as possible, without burning the thin parts; before forging be sure that the piece is heat through, and then commence upon the thin parts as they cool the quickest. Work quickly and boldly, reducing the power of the blows as the color darkens, and cease hammering just as soon as the bright redness is lost. There are scarcely two brands of steel that can be worked in a similar manner, and in order to secure uniformity the workman should carefully note the method of working, and having accomplished a good result he should continue the use of the one grade.

SAWDUST.

A box of sawdust should be at every finisher's bench; there is nothing superior to it for cleaning iron of grease; it absorbs the grease rapidly, and the use of it saves time in cleaning up irons that have been drilled. Any kind will answer but pine; this leaves a resinous deposit that is very objectionable.

No. 9.

Table of Kinds and Sizes of Iron Used in Constructing a Four-Passenger Rockaway on Three Springs and Perch Carriage. Track, 4 Feet 8 Inches or 4 Feet 10 Inches.

Sectional Parts.	Metal.	Shape.	Size.
Axles, front.....	Case hardened	Nnt.	1½x7 inches.
Back.....	Case hardened	Nnt.	1½x7 inches.
Piece part, front.....	Low Moor iron		1x1½ inch.
Piece part, back.....	Low Moor iron		1x1¼ inch.
Springs.....			1½ inches.
Front.....			6 plates.
Length.....			38 inches.
Open.....			10½ inches.
Main and second plates.....	Swedes steel, oil temper.	Elliptics, button heads, oval points.	No. 2.
Third and fourth plates.....			No. 3.
Fifth and sixth plates.....			No. 4.
Back.....			4 plates.
Length.....			37 inches.
Open.....			7½ inches.
Main plate.....			No. 2.
Second plate.....			No. 3.
Third and fourth plates.....			No. 4.
Fifth wheel.....		Half circle.	15 inches.
Plates.....	Burden's iron.	Half round.	14x½ inches.
Bottom clips.....	Burden's iron.		14 wide.
Bolt ends.....			¾ inch.
Front bar to upper section.....	Burden's iron.	Round.	¾ inch.
Stay.....	Norway iron		14x¾ inches.
Neck portion.....		Oval	1x½ inch.
Shaft irons.....	Ulster iron	Half oval.	13x½ inches.
Length on bar.....			10 inches.
Front of bar.....			12 inches.
Head.....			1½x¾ inches.
Bolts.....	Norway iron		¾ inch.
Jack clips.....	Norway iron		1½ inches wide.
Strap.....			1½ inch.
Ends.....			¾ inch.
Bolts.....	Norway iron		½ inch.
Pole, bottom plate on the bar.....	Burden's iron.	Half oval.	14x¾ inches.
Top plate.....	Norway iron	Half oval	1x1¼ inches.
Onter stay.....	Burden's iron.	Oval.	¾x¾ inch.
Inside branches.....	Burden's iron.	Oval.	¾x¾ inch.
Necks.....	Burden's iron.	Round.	¾ inch.
At heads.....	Burden's iron.	Round.	¾ inch.
Bolts for plates.....	Norway iron		¾ inch.
Bolts for stays.....	Norway iron.		¾ inch.
Bolt for double tree.....	Norway iron.		¾ inch.
Bolt for Whiffletree.....	Norway iron		¾ inch.
Perch plate, front end.....	Norway iron		14x¾ inches.
Piece out with.....	Burden's iron	Half oval.	14x¾ inches.
Back end.....	Norway iron		14x¾ inches.
Clip.....	Norway iron	Half oval	14x¾ inches.
Ends.....		Round.	¾ inch.
Top plate.....		Half oval.	14x¾ inches.
Side stays.....	Norway iron.	Oval.	1x¾ inch.
Perch portion.....	Norway iron.	Half oval	1x½ inch.
Extra stay at head block.....	Low Moor iron	Oval.	¾x¾ inches.
Branch stays.....	Low Moor iron.	Oval.	¾x¾ inch.
Axle clips, front.....	Norway iron.		14 inches.
Ends.....			¾ inch.
Spring clips.....	Norway iron.		12x½ inches.
Brakes.....	Ulster iron	Swaged half oval	14 inches.
Bolts at springs.....			¾ inch.
Tire.....	Steel		1½x14 inches.
Tire.....	Compound iron.		1½x14 inches.
Bolts.....	Norway iron.	Tire.....	¼ inch.
Step.....	Sheet iron.	Horseshoe.....	No. 10.
Pad.....			5x5½ inches.
Shank.....	Burden's iron	Square	¾ inch.
At pad.....		Round.	¾ inch.
Bolt part.....	Norway iron.		14x¾ inches.
Cover.....	Sheet iron.		No. 14.
Flange.....	Band iron.		¾x1½ inch.
Shank.....	Burden's iron.	Octagon	¾ inch.
At cover.....		Round.	½ inch.
Step bolts.....	Norway iron.		¾ inch.
Dash.....		Straight	14½ inches high.
Heels.....	Norway iron.		14x½ inches.
Outer and bottom bars.....	Ulster iron	Oval.	¾x¾ inch.
Additional bars.....	Ulster iron	Oval.	¾x¾ inch.
Handles.....	Ulster iron.	Oval.	¾x¾ inch.
Bolts.....	Norway iron.		¾ inch.
Side rails.....	Ulster iron	Round.	¾x½ inch.
Railroad backs, bottom.....	Ulster iron	Half oval	¾x¾ inch.
Uprights.....	Ulster iron	Oval.	¾x¾ inch.
Hight.....			16½ inches.
Rocker plates at neck.....	L. W.		24x½ inches.
Ends.....	L. W.		24x¾ inches.
Screws.....			No. 18.
Hnb bands, back.....	Band iron		¾x1½ inch.
Front.....	Band iron		No. 9.
Screws.....			No. 8.
Fifth wheel bolts.....	Norway iron.		¾ inch.
Perch bolts.....	Norway iron.		¾ inch.

No. 10.

**Table of Kinds and Sizes of Iron Used in Constructing a light Six Passenger Rockaway,
Perch Carriage, 4 feet, 10 inch Track.**

Sectional Parts.	Metal.	Shape.	Size.
Axles, nut.....	Case hardened.....	Plain taper.....	1 $\frac{1}{2}$ x7 inches.
Piece part, front.....	Low Moor iron.....	Square.....	1 $\frac{1}{2}$ x1 inches.
Piece part, back.....	Low Moor iron.....	Square.....	1 $\frac{1}{2}$ x1 $\frac{1}{8}$ inches.
Springs, front, 5 plates.....			1 $\frac{1}{2}$ inches.
Length.....			38 inches.
Open.....			7 inches.
Main and second plates.....	Swedes steel, oil temper.	Full elliptic; button heads; top plates, oval points; bottom plates, round points.	No. 2.
Remaining plates.....			No. 3.
Back, 5 plates.....			1 $\frac{3}{4}$ inches.
Length.....			40 inches.
Open.....			10 inches.
Main, second and third plates..			No. 2.
Remaining plates.....			No. 3.
Fifth wheel.....	Norway iron.....		15 inches.
Plates.....	Norway iron.....	Half round.....	1 $\frac{1}{4}$ inches.
Bolts.....	Norway iron.....		$\frac{1}{8}$ inch.
Shaft irons.....	Burden's iron.....	Swaged.....	1 $\frac{3}{8}$ x $\frac{3}{8}$ inches.
Length front of bar.....			16 inches.
Length on bar.....			12 inches.
Bolts.....	Norway iron.....		$\frac{1}{8}$ inch.
Jack.....	Norway iron.....	Plain.....	
Heads.....			1 $\frac{3}{8}$ inches.
Bolt.....	Norway iron.....		$\frac{1}{2}$ inch.
Pole stays.....	Refined.....	Oval.....	3 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Tie plate.....	Norway iron.....		3 $\frac{1}{8}$ inch thick.
Top plate.....	Norway iron.....	Half oval.....	$\frac{1}{8}$ inch thick.
Main whiffletree bolt.....	Norway iron.....		$\frac{1}{8}$ inch.
Other whiffletree bolts.....	Norway iron.....	T heads.....	3 $\frac{1}{8}$ inch.
Perch plate, end.....	Norway iron.....	Flat.....	1 $\frac{3}{8}$ x $\frac{3}{8}$ inch.
Center part.....	Burden's iron.....	Swaged.....	1 $\frac{3}{8}$ x $\frac{3}{8}$ inch.
Head plate.....	Norway iron.....		1 $\frac{1}{2}$ x $\frac{1}{2}$ inches.
Bolts.....	Norway iron.....		$\frac{1}{8}$ inch.
Side stays, outer branches.....	Low Moor iron.....	Oval.....	3 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Inner branches.....	Low Moor iron.....	Oval.....	3 $\frac{1}{4}$ x $\frac{3}{8}$ inch.
Front branches.....	Low Moor iron.....	Oval.....	3 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Ends at head block.....	Norway iron.....	Half oval.....	1 $\frac{1}{8}$ x $\frac{1}{4}$ inch.
Heels.....	Norway iron.....	Half oval.....	1 $\frac{3}{8}$ x $\frac{1}{2}$ inches.
Bolts.....	Norway iron.....		$\frac{1}{4}$ inch.
Body loops.....	Low Moor iron.....	Swaged.....	1 $\frac{1}{4}$ x1 inches.
Heads.....		Turned.....	1 $\frac{1}{8}$ inches.
Bolts.....	Norway iron.....		$\frac{1}{8}$ inches.
Clip king bolt.....	Norway iron.....		1 $\frac{1}{8}$ inches.
Bolt portion below spring.....			$\frac{1}{8}$ inch.
Bolt portion through spring.....			$\frac{1}{8}$ inch.
Clips.....	Norway iron.....		1 $\frac{1}{8}$ inches.
Bolt portion.....			3 $\frac{1}{8}$ inch.
Tire.....	Common iron.....		1 $\frac{1}{4}$ x $\frac{3}{8}$ inches.
Tire.....	Compound iron.....		1 $\frac{1}{4}$ x $\frac{1}{2}$ inches.
Tire.....	Steel.....		1 $\frac{1}{4}$ x $\frac{1}{4}$ inches.
Bolts.....	Norway iron.....		$\frac{1}{4}$ inch.
Step pad without covers.....	Norway iron.....	Square.....	7x8 $\frac{1}{2}$ inches.
Main branch.....	Burden's iron.....	Octagon and square.....	$\frac{7}{8}$ inch.
At pad.....		Oval.....	1 $\frac{1}{8}$ x $\frac{3}{4}$ inches.
Pad, if cover is used.....	Sheet iron, No. 10.....	Horseshoe.....	6x7 $\frac{1}{2}$ inches.
Cover.....	Sheet iron, No. 14.....	Horseshoe.....	7x8 $\frac{1}{2}$ inch.
Back stays.....	Burden's iron.....	Oval.....	3 $\frac{1}{8}$ x $\frac{3}{4}$ inch.
Bolts.....	Norway iron.....		3 $\frac{1}{8}$ inch.
Dash.....			16 inches high.
Bars.....	Low Moor iron.....	Oval.....	3 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Foot rod.....	Burden's iron.....	Oval.....	7 $\frac{1}{8}$ x $\frac{1}{2}$ inch.
Front side rails.....	Burden's iron.....	Round.....	$\frac{1}{2}$ inch.
Arch plates.....	Burden's iron.....	Half oval.....	7 $\frac{1}{8}$ x $\frac{1}{4}$ inch.
Screws.....			$\frac{1}{8}$ inch No. 11

ACID TEST FOR IRON AND STEEL.

To test metal, first clean and polish the piece on all sides, then place it in diluted nitric or sulphuric acid for twenty-four hours, after which wash and dry it; an examination will show the action of the acid. The best steel will present a frosted appearance, inferior steel will be honeycombed; iron will present a fibrous stricture. If different kinds of iron have been welded together the peculiar characteristics of the fibre of each will be revealed. Gray cast iron shows crystal of graphic carbon, other cast irons have the figures equally well defined, each possessing marked characteristics.

WELDING COMPOUNDS.

For steel, 2 ounces of copperas, 4 ounces of salt, and 4 lbs. of white sand; mix all well together and use the same as with sand.

Equal parts of pulverized borax and glass may be wet with alcohol and heated to a red heat in a crucible; when cold pulverize finely and use the same as borax.

No. 11.

Table of the Kinds and Sizes of Iron Used in Constructing a Cabriolet on Two Springs. Track, 4 Feet 8 Inches, or 4 Feet 10 Inches.

Sectional Parts.	Metal.	Shape.	Size.
Axles	Case hardened iron.	Mail or nut.	1½x7 inches.
Piece part, front.	Low Moor iron.	Square	1½x7½ inches.
Piece part, back.	Low Moor iron.	Square	1½x1½ inches.
Springs, front, 5 plates.	Swedes steel, oil temper.	Elliptics; button heads; point to top plates oval; bottom plates round.	13½ inches.
Length			36 inches.
Open			10 inches.
Main and second plates.			No. 3.
Additional plates.			No. 4.
Back, 6 plates.			11½ inches.
Length.			39 inches.
Open.	Norway iron.	Half round.	11½ inches.
Main, 2d and 3d plates.			No. 3.
Additional plates.			No. 4.
If child seat used, front 5 plates.	Norway iron.		1½ inches.
Fifth wheel	Norway iron.		16 inches.
Plates	Norway iron.		1½x3½ inches.
Bolt ends.	Norway iron.		¾ inch.
Bolts	Norway iron.		¾ inch.
Shaft iron	Burden's iron.	Swaged.	1½x7½ inches.
Length on bar.			12 inches.
Length front of bar.			15 inches.
Bolts	Norway iron.		¾ inch.
Whiffletree bolt.	Norway iron.	T head.	¾ inch.
Jack clips.	Norway iron.	Plain	
Heads			1½ inches.
Bolts	Norway iron.		¾ inch.
Bolt ends to clip.	Norway iron.		¾ inch.
Perch plate, fifth wheel end.	Norway iron.	Flat.	1½x3½ inches.
Back end.	Norway iron.	Swaged.	1½x3½ inches.
Center part.	Burden's iron.	Half oval.	1½x7½ inches.
Top plate ends.	Norway iron.	Half oval.	1½x1½ inches.
Center part.	Burden's iron.	Half oval.	1½x1½ inches.
Bolts	Norway iron.		¾ inch.
Head plate.	Norway iron.	Flat.	1½x3½ inches.
Side stays, back branches.	Burden's iron.	Oval.	¾x7½ inch.
Outside front branches.	Burden's iron.	Oval.	¾x7½ inch.
Inside front branches.	Burden's iron.	Oval.	¾x3½ inch.
Bolts	Norway iron.		¾ inch.
Main front bolt.	Norway iron.		¾ inch.
Back bolt.	Norway iron.		¾ inch.
Body loops.	Low Moor iron.	Full oval.	1½ inches.
Heads, deep.			1 inch.
Bolts	Norway iron.		¾ inch.
Bolts for front end.	Norway iron.		¾ inch.
Clip king bolt.	Norway iron.		¾ inch.
Bolt end.			¾ inch.
King bolt at head plate.		Tapered.	¾ to 1 inch.
Tire	Steel		1½x7½ inches.
Tire	Common iron.		1½x7½ inches.
Bolts	Norway iron.	Tire.	¾ inch.
Step pads.	Sheet iron.	Square	6x10 inches.
Shank.	Ulster iron.	Octagon and round.	7x7½ inch.
Step on front axle pad.	Sheet iron.	Square	4x4½ inches.
Shank.	Low Moor iron.	Square	¾ inch.
Dash			14 inches high.
Outside and bottom bars.	Low Moor iron.	Oval.	5x3½ inch.
Center and top bar.	Low Moor iron.	Oval.	5x7½ inch.
Bolts	Norway iron.		¾ inch.
Seat rail.		Round.	¾ inch.
Stump joints, back.	Norway iron.		7x5½ inch.
Piece	Low Moor iron.	Oval	¾x7½ inch.
Front.	Norway iron.		¾x3½ inch.
Piece	Low Moor iron.	Oval.	¾x3½ inch.
Wings, outside bars.		Oval.	¾x3½ inch.
Inside bars.		Oval.	¾x7½ inch.
Rocker plates, at neck	L. W. iron.	Flat.	2x1½ inches.
At ends.			2x3½ inches.
Screws			No. 16.
Pole irons, goose necks.	Norway iron.	Round.	¾ inch.
Bottom plate on pole.	Norway iron.	Half oval.	1½x7½ inch.
On bar.	Norway iron.	Half oval.	7x7½ inch.
Top plate.	Norway iron.	Half oval.	7x7½ inch.
Side stays, outside.	Burden's iron.	Oval.	¾x7½ inch.
Inside.	Burden's iron.	Oval.	¾x3½ inch.
Bolts	Norway iron.		¾ inch.
Whiffletree bolts	Norway iron.		¾ inch.
Evener bolt	Norway iron.		¾ inch.

ANNEALING STEEL.

Steel, whether crucible or other, can be annealed by heating it to a bright red and plunging it into hot water; the water must be at a boiling point. Steel annealed this way is harder than when annealed in the ordinary manner, but it is much tougher. When the steel is put into the water it does not cool quickly and the uniform heat which slowly diminishes tempers the metal.

No. 12.

Table of Kinds and Sizes of Iron Used in Ironing a Victoria on Platform Springs, 4 feet 8 or 4 feet 10-inch Track.

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened	Nut or mail.....	11x7 ¹ / ₂ inches.
Piece part.....	Low Moor iron		1 ³ / ₈ inches.
Springs.....			1 ¹ / ₂ inches.
Front.....			3 plates.
Length.....			30 inches.
Open.....			6 inches.
Main and second plates.....			No. 3.
Additional plates.....			No. 4.
Back.....			4 plates.
Length.....			36 inches.
Open.....			7 inches.
Main plate.....	Swedes steel.	Elliptic oval point top plates, square ends on bottom plates, but- ton heads.	No. 2.
Additional plates.....			No. 3.
With cross spring, the main and 2d plates.....			No. 3.
Additional plates.....			No. 4.
Cross spring.....			4 plates.
Main and second plates.....			No. 2.
Additional plates.....			No. 3.
Fifth wheel.....	Burden's iron.....		1 ¹ / ₈ x ³ / ₈ inches.
Top plate of top bed.....	Norway iron.....	Half round.....	7x1 ¹ / ₂ inch.
Bottom bed bottom plate.....	Ulster iron.....	Full half round.....	1 ¹ / ₄ x ⁵ / ₈ inches.
Bottom bed top plate.....	Ulster iron.....	Half oval.....	7x ³ / ₈ inch.
Back bar, top carriage.....	Low Moor iron.....	Oval.....	1x ⁵ / ₈ inch.
Bottom socket.....	Norway iron.....	Oval.....	1x ³ / ₄ inch.
Side stays at spring bearing.....	Ulster iron.....	Flat.....	1 ¹ / ₂ x ³ / ₈ inch.
Front end.....	Ulster iron.....	Round.....	3x1 ¹ / ₂ inch.
Back end.....	Ulster iron.....	Round.....	1 ¹ / ₈ inch.
Bottom plates to futchels.....	Burden's iron.....	Square.....	3 ¹ / ₄ inch.
Front end.....	Burden's iron.....	Half oval.....	1 ¹ / ₄ x ³ / ₈ inch.
Back end.....	Burden's iron.....		3x1 ¹ / ₂ inch.
Inside plate to futchels.....		Half oval.....	1x ³ / ₈ inch.
Top plate of top bed at center.....	Ulster iron.....	Swaged.....	1 ¹ / ₄ x ¹ / ₈ inch.
Ends.....		Flat.....	3x1 ¹ / ₈ inch.
King bolt.....	Norway iron.....		1 ¹ / ₈ inch.
Outside trace steps or knobs.....	Norway iron.....	Oblong.....	2 ³ / ₈ inches.
Inside trace steps or knobs.....	Norway iron.....	Round.....	2 inches.
Bolt.....	Norway iron.....		3 ¹ / ₈ inch.
Box clips.....	Norway iron.....		1 ¹ / ₂ x ³ / ₈ inch.
Securing clips.....	Norway iron.....		5x ³ / ₈ inch.
Ends.....			3 ¹ / ₈ inch.
Bolts for inside plates of futchels.....	Norway iron.....		1 ¹ / ₈ inch.
Other bolts.....	Norway iron.....		1 ¹ / ₈ inch.
Draw bar plate.....	Norway iron.....	Half oval.....	1 ¹ / ₄ x ¹ / ₈ inches.
Plates for wooden brakes.....	Low Moor iron.....	Swaged, half round.....	1 ⁵ / ₈ x ⁵ / ₈ inches.
Iron brakes.....	Burden's iron.....	Square.....	1 ¹ / ₄ x1 ¹ / ₄ inches.
At back shoulder.....		Swaged.....	1 ³ / ₈ x1 inches.
Bolts for back end.....	Norway iron.....		3 ¹ / ₈ inch.
Front loop, butts.....	Low Moor iron.....	Square.....	4 inch.
Bolts.....			3 ¹ / ₈ inch.
Front ends.....		Oval.....	1x ³ / ₄ inch.
Bolts.....			5 ¹ / ₈ inch.
Step pad.....	Sheet iron.....		No. 10.
Pad.....			6 ¹ / ₂ x10 inches.
Step shank.....	Ulster iron.....	Octagon and round.....	7 ¹ / ₈ inch.
Wings, inside bars.....	Low Moor iron.....	Oval.....	5x ³ / ₈ inch.
Other bars.....	Low Moor iron.....	Oval.....	5x ¹ / ₈ inch.
Securing bolts.....		Countersunk.....	1 ¹ / ₈ inch.
Tire.....	Steel.....		1 ¹ / ₈ x1 ¹ / ₄ inches.
Tire.....	Compound.....		1 ¹ / ₈ x ¹ / ₈ inch.
Tire.....	Iron.....		1 ¹ / ₈ x ³ / ₈ inches.
Bolts.....	Norway iron.....		4 inch.
Hub bands (thick).....	Band iron.....	Plain; jagged.....	4 ¹ / ₈ inch.
Steps for top carriage.....	Sheet iron.....		No. 10 4x4 ¹ / ₂ in
Shaft plates to crook.....			
Ends.....		Half oval.....	1x ¹ / ₈ inch.
Screw.....			3 ¹ / ₄ inch No. 10.
Bolts for back end.....	Norway iron.....		4 inch.
Draft bolts.....	Norway iron.....		1 ¹ / ₈ inch.
Dash, light.....			15 inches.
Handles.....		Oblong.....	2 ¹ / ₂ inches.
Main and bottom bars.....	Low Moor iron.....	Oval.....	3x ³ / ₈ inch.
Additional at rails.....	Low Moor iron.....	Oval.....	5x ³ / ₈ inch.
Front seat rail.....	Ulster iron.....	Round.....	7 ¹ / ₈ inch.
Light, front.....			6 inches.
back.....			6 ³ / ₄ inches.
Bracket plates.....	Common iron.....	Half oval.....	1 ¹ / ₄ x1 ¹ / ₄ inches.
Back joints.....		Stump joints.....	7x ³ / ₈ inch.
Piece part.....	Norway iron.....	Oval.....	7x ¹ / ₈ inch.
Front joints.....		Stump joints.....	3x1 ¹ / ₂ inch.
Piece part.....	Norway iron.....	Oval.....	5x ¹ / ₈ inch.
Plate for front bow.....	Band iron.....		1x ¹ / ₈ inch.
Rocker plates.....	L. W. iron.....		2 ¹ / ₂ x ³ / ₈ inches.
Screws.....			No. 18.

No. 13.

Table of Kinds and Sizes of Iron Used in Constructing a Victoria on C Springs, 4 Feet 8 Inch or 4 Feet 10 Inch Track.

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened	Collinge	11 $\frac{1}{4}$ x 7 $\frac{1}{2}$ inches.
Piece part.....	Low Moor iron		13 $\frac{1}{8}$ inches.
Springs.....			13 $\frac{1}{4}$ inches.
Front.....			5 plates.
Length.....			40 inches.
Open.....			11 $\frac{1}{2}$ inches.
Main plate.....			No. 2.
Second and third plates.....			No. 3.
Fourth, fifth and sixth.....			No. 4.
Back.....	Oil temper, Swedes steel.	Ends of all the plates square, top plates chamfered, button heads.	5 plates.
Length.....			38 inches.
Open.....			10 inches.
Main, second and third plates.....			No. 2.
Fourth and fifth plates.....			No. 3.
C springs.....			6 plates.
First, second and third plates.....			No. 2.
Fourth, fifth and sixth.....			No. 3.
Fifth wheel.....		Full circle	26 inches.
Bottom section.....	Burden's iron	Flat	13 $\frac{1}{8}$ x 3 $\frac{1}{8}$ inches.
Top section.....	Burden's iron	Half oval	13 $\frac{1}{8}$ x 3 $\frac{1}{8}$ inches.
Molding.....		Half round	12 x 3 $\frac{1}{8}$ inch.
Hook.....	Norway iron		1 $\frac{1}{2}$ inch thick.
Bottom bed, bottom plate.....	Burden's iron	Full half round	13 $\frac{1}{8}$ x 3 $\frac{1}{8}$ inches.
Bottom bed, top plate.....	Burden's iron	Half oval	1 x 3 $\frac{1}{8}$ inch.
Top bed, bottom plate.....	Norway iron	Flat half oval	13 $\frac{1}{8}$ x 3 $\frac{1}{8}$ inches.
Top bed, top plate, center.....	Norway iron		13 $\frac{1}{8}$ x 1 $\frac{1}{2}$ inches.
Ends.....			1 x 1 $\frac{1}{8}$ inch.
Bottom plates of futchels, front.....	Burden's iron		3 $\frac{1}{8}$ inch thick.
Center.....	Burden's iron	Square	1 inch.
Ends.....		Full oval	1 x 3 $\frac{1}{4}$ inch.
Edge.....		Flat	1 $\frac{1}{8}$ inch.
Back support to futchel.....			3 $\frac{1}{4}$ inch thick.
Ends tapered to.....			7 $\frac{1}{8}$ inch.
Jaw plates.....		Band iron	No. 10.
Side stay at spring bearing.....	Low Moor iron		13 $\frac{1}{4}$ x 5 $\frac{1}{8}$ inches.
Ends.....	Low Moor iron	Round	7 $\frac{1}{8}$ inch.
Tapered to.....			3 $\frac{1}{8}$ inch.
At the futchels.....			1 x 7 $\frac{1}{8}$ inch.
At the front end.....	Norway iron	Swaged	3 $\frac{1}{8}$ inch.
Collars.....		Solid	1 inch.
King bolt.....	Norway iron		3 $\frac{1}{4}$ inch.
Frog or socket arms.....	Norway iron	Oval	1 x 3 $\frac{1}{4}$ inch.
Evener bar bolt.....	Norway iron		5 $\frac{1}{8}$ inch.
Bearing plate.....			1 $\frac{1}{2}$ inch thick.
Bottom plate.....	Band iron		No. 8.
Strap loops.....			14 x 1 $\frac{1}{2}$ inches.
Pole bridge.....	Burden's iron		13 $\frac{1}{4}$ x 1 $\frac{1}{4}$ inches.
Box clips.....	Norway iron		13 $\frac{1}{4}$ x 7 $\frac{1}{8}$ inches.
Securing clips.....	Norway iron	Flat	7 $\frac{1}{8}$ x 1 $\frac{1}{2}$ inch.
Ends.....			1 $\frac{1}{2}$ inch.
Clip bars.....	Horseshoe iron	Flat	7 $\frac{1}{8}$ x 1 $\frac{1}{2}$ inch.
Back bar, front carriage.....	Norway iron		13 $\frac{1}{4}$ x 3 $\frac{1}{4}$ inches.
Arms from elliptic to body.....	Low Moor iron	Full oval	14 x 1 inches.
Back loops at butt.....	Low Moor iron	Square	1 $\frac{1}{2}$ inches.
Back end.....		Half oval	14 inches.
Edge.....			3 $\frac{1}{8}$ inch.
Jacks for spring arms.....	Norway iron		13 $\frac{1}{4}$ x 3 $\frac{1}{8}$ inches.
Bolts.....	Norway iron		5 $\frac{1}{8}$ inch.
Step pad.....	Norway iron	Grate	7 x 9 inches.
Step shank.....	Burden's iron	Oval	7 $\frac{1}{8}$ inch.
Joints.....			5 $\frac{1}{8}$ inch.
Tire.....	Compound iron		15 $\frac{1}{8}$ x 7 $\frac{1}{8}$ inches.
Tire.....	Low Moor iron		15 $\frac{1}{8}$ x 7 $\frac{1}{8}$ inches.
Tire.....	Common iron		15 $\frac{1}{8}$ x 5 $\frac{1}{8}$ inches.
Bolts.....		Tire	7 $\frac{1}{8}$ inch.
Hub bands, back.....	Band iron		No. 8.
Front.....	Band iron		No. 9.
Rocker plates.....	Common iron		31 $\frac{1}{2}$ x 1 $\frac{1}{2}$ inches.
Or of.....	Low Moor iron		31 $\frac{1}{2}$ x 7 $\frac{1}{8}$ inches.
Screws.....			No. 20.
Stump joints.....			1 x 5 $\frac{1}{8}$ inch.
Piece part.....		Oval	7 $\frac{1}{8}$ x 3 $\frac{1}{8}$ inch.
Toe board plate.....		Half oval	13 $\frac{1}{4}$ x 3 $\frac{1}{4}$ inches.
Seat rail, single seat.....	Burden's iron	Round	7 $\frac{1}{8}$ inch.
Double seat.....	Burden's iron	Round	1 $\frac{1}{2}$ inch.
Front stay.....	Norway iron	Oval	14 x 7 $\frac{1}{8}$ inch.
Wings, inside bars.....	Common iron	Oval	34 x 1 $\frac{1}{2}$ inch.
Outer bar.....	Common iron	Oval	58 x 3 $\frac{1}{8}$ inch.
Bolts for securing front carriage.....	Norway iron		7 $\frac{1}{8}$ and 3 $\frac{1}{8}$ inch.
Screws.....			No. 14.
Body bolts.....	Norway iron		7 $\frac{1}{8}$ inch.
Step bolts.....	Norway iron		3 $\frac{1}{8}$ inch.
Loop bolts.....	Norway iron		3 $\frac{1}{8}$ inch.
Bolts for securing C spring.....	Norway iron		7 $\frac{1}{8}$ inch.

No. 14.

Table of Kinds and Sizes of Iron Used in Constructing a Light Carriage; Front Track, 3 Feet 6 Inches; Back Track, 4 Feet 2 Inches.

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened iron.	Nut or mail.....	1 1/2 x 7 inches.
Piece part.....	Low Moor iron.....	Bar.....	1 3/8 inches.
Springs.....			1 1/2 inches.
Front.....			4 plates.
Length.....			36 inches.
Open.....			9 inches.
Main plate.....			No. 2.
Second plate.....			No. 3.
Third and fourth plates.....			No. 4.
Back.....	Best quality Swedish steel, oil temper.	Top plates thin, square ends; button ends beveled and square; button heads. If the back spring is placed on the back axle, it is but 7 inches open.	4 plates.
Length.....			38 inches.
Open.....			9 1/2 inches.
Main and second plates.....			No. 2.
Third plate.....			No. 3.
Fourth plate.....			No. 4.
Fifth wheel.....	Norway iron.....	Half circle.....	20 inches.
Plates.....			1 1/2 x 3 1/2 inches.
Bottom bed, bottom plate.....	Burden's iron.....	Full half oval.....	1 1/2 x 1 1/2 inches.
Bottom bed, top plate.....	Burden's iron.....	Half oval.....	1 1/2 x 1 inch.
Bottom plate of futchels.....	Burden's iron.....	Square.....	3 1/2 inch.
Either side of concave.....			7 1/2 x 1 1/2 inch.
Back end.....	Norway iron.....	Half oval.....	3 1/2 x 1 1/2 inch.
Front end.....	Norway iron.....	Half oval.....	1 1/2 x 1 1/2 inches.
Side stay at spring bearing.....	Burden's iron.....		1 1/2 x 1 1/2 inches.
Length.....			5 1/2 inches.
Front end.....		Oval.....	7 1/2 x 1 1/2 inch.
Back end.....		Oval.....	3 1/2 x 1 1/2 inch.
Shatt jaw.....	Norway iron.....	Half oval.....	1 1/2 x 1 1/2 inches.
Inside plate to futchel.....	Norway iron.....		1 1/2 x 1 1/2 inches.
End at outside stay.....	Norway iron.....	Half oval.....	1 1/2 x 1 1/2 inches.
Bolts.....	Norway iron.....		3/8 inch.
Socket plate.....	Norway iron.....	Full half oval.....	1 1/2 x 1 1/2 inches.
Top plate of top bed.....	Burden's iron.....	Full half round.....	1 1/2 x 1 1/2 inches.
Ends.....			7 1/2 x 1 1/2 inch.
Top futchel plates.....	Burden's iron.....	Half oval.....	7 1/2 x 1 1/2 inch.
King bolt.....	Norway iron.....	Plain pattern.....	5/8 inch.
Bottom socket for king bolt.....	Norway iron.....	Oval.....	1 x 3/4 inch.
Ends.....			1 x 3/8 inch.
Pole socket, diameter.....	Ulster iron.....		1 1/4 inch.
Length.....			1 1/2 inch.
Draw bar pole socket.....			2 3/8 x 2 1/8 inches.
Bottom plate.....	Norway iron.....		1 1/2 x 1 1/2 inches.
Trace knobs.....	Ulster iron.....	Round.....	2 1/8 inches.
Bolt part.....			3/8 inch.
Bottom plate to shafts.....		Half oval.....	1 x 3/8 inches.
Crook portion.....			3 1/2 x 3/8 inch.
Bolts.....	Norway iron.....		1/4 inch.
Screws.....			No. 14, 1 inch.
Draft bolts.....	Norway iron.....		1/2 inch.
Tire.....	Steel.....		1 1/2 x 1 1/2 inches.
Tire.....	Common iron.....		1 1/2 x 1 1/2 inches.
Tire.....	Iron.....		1 1/2 x 1 1/2 inches.
Bolts.....	Norway iron.....	Tire.....	1/4 inch.
Back band to hubs.....			1/8 inch thick.
Front band to hubs.....			1/8 inch thick.
Rocker plate at arch.....	L. W. iron.....		3 x 1 1/2 inches.
Ends.....			3 x 3/8 inches.
Dash.....			13 inches high.
Side and bottom bars.....	Burden's iron.....	Oval.....	3 1/2 x 3/8 inch.
Center and top bars.....	Burden's iron.....	Oval.....	3 1/2 x 3/8 inch.
Sent rail.....	Ulster iron.....	Round.....	1 1/2 inch.
Plates for wood brakes.....	Burden's iron.....	Half round.....	1 1/2 x 5/8 inches.
Bolts.....	Norway iron.....		1/2 inch.
Step pads.....	Sheet iron, No. 10.....	Horseshoe.....	5 3/4 x 7 inches.
Shank.....	Ulster iron.....	Octagon and round.....	7 1/2 x 7/8 inch.
At pad.....		Round.....	5/8 inch.
Bolts.....			1/2 inch.
Cover.....	Sheet iron.....		No. 14.
Shank.....	Norway iron.....	Octagon and round.....	7/8 x 1 1/2 inch.
At cover.....			1/2 inch.
Flange to cover.....	Norway band iron.....		5 1/2 x 3/8 inch.
Fender.....	Burden's iron.....	Oval.....	5 1/2 x 3/8 inch.
Width.....			5 inches.

TO CASE-HARDEN IRON.

Heat the iron to a cherry red and sprinkle it well with prussiate of potash, using a coarse pepper box, cover all parts thoroughly, put the iron back into the fire and heat it red, then plunge it into cold water, being careful to hold the piece perpendicular to prevent springing.

No. 15.

Table of the Kinds and Sizes of Iron Used in Constructing a Brougham Platform Carriage:
Track, 4 Feet 6 Inches, and 4 Feet 10 Inches.

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened iron.	Nut or mail.	14x7 $\frac{1}{2}$ inches.
Piece part.....	Low Moor iron.		13 $\frac{1}{8}$ inch.
Springs.....			12 inch.
Front.....			4 plates.
Length.....			36 inches.
Open.....			10 inches.
First and second plates.....			No. 2.
Third plate.....			No. 3.
Fourth plate.....			No. 4.
Back.....		Full elliptics front and back, or full elliptic front with combination cross spring back, button heads, oval ends to plates.	4 plates.
Length.....			38 inches.
Open.....	First-quality steel.		8 $\frac{1}{2}$ inches.
First plate.....			No. 2.
Second plate.....			No. 3.
Third and fourth plates.....			No. 4.
Cross spring.....			4 plates.
Length.....			38 inches.
Rise.....			3 $\frac{1}{2}$ inches.
First plate.....			No. 2.
Second and third plates.....			No. 3.
Fourth plate.....			No. 4.
Fifth wheel.....	Burden's iron.	Half circle.	22 inches.
Top plates.....		Half round.	12x5 $\frac{1}{8}$ inch.
Bottom plates.....		Flat.	12x3 $\frac{1}{8}$ inch.
Bottom bed, bottom plate.....	Burden's iron.	Full half round.	12x5 $\frac{1}{8}$ inch.
Top bed, top plate.....	Norway iron.	Half oval.	14x1 $\frac{1}{2}$ inch.
Bottom bed, top plate.....	Burden's iron.	Half oval.	12x3 $\frac{1}{8}$ inch.
Top bed, bottom plate.....	Norway iron.	Flat half oval.	14x3 $\frac{1}{8}$ inch.
Futchel side stays.....	Ulster iron.		12x5 $\frac{1}{8}$ inch.
Spring bearing.....			6 inches long.
Front piece.....	Ulster iron.	Round.	5 $\frac{1}{8}$ inch.
End.....			7 $\frac{1}{16}$ inch.
Futchel plate.....	Norway iron.		1x1 $\frac{1}{2}$ inch.
Back piece.....	Ulster iron.	Round.	5 $\frac{1}{8}$ inch.
End.....			7 $\frac{1}{16}$ inch.
Bearing.....			7x7 $\frac{1}{8}$ inch.
Bottom plates of futchels, center.....	Burden's iron.	Full oval.	5 $\frac{1}{8}$ and 7 $\frac{1}{8}$ inch.
Piece, back.....	Burden's iron.		7x1 $\frac{1}{2}$ inch.
Piece, front.....	Burden's iron.	Chamfer edges.	7 $\frac{1}{16}$ inch thick.
Jaw plates.....	Band iron.		No. 10.
King bolt.....	Norway iron.		5 $\frac{1}{8}$ inch.
Pole bridge.....	Ulster iron.		12x1 $\frac{1}{4}$ inch.
Pole stop.....	Ulster iron.		3x1 $\frac{1}{2}$ inch.
Pole hook.....	Norway iron.		3 $\frac{1}{8}$ inch bolt end.
Bottom plate evener bar.....	Band iron.		No. 10.
Evener bar king bolt.....	Norway iron.		1 $\frac{1}{2}$ inch.
King bolt plate.....	Ulster iron.		7 $\frac{1}{16}$ inch.
King bolt stay.....	Norway iron.	Round.	7 $\frac{1}{16}$ inch.
Socket plate.....	Norway iron.	Oval.	1x5 $\frac{1}{8}$ inch.
Bottom plate of futchel.....		Half oval.	7 $\frac{1}{8}$ inch.
Axle clips.....	Norway iron.		2x3 $\frac{1}{8}$ inch.
Securing clips.....	Norway iron.	Swaged half round.	5x3 $\frac{1}{8}$ inch.
Bolt ends.....			3 $\frac{1}{8}$ inch.
Bolts.....	Norway iron.		7 $\frac{1}{16}$ inch.
Tire.....	Low Moor iron.		13x7 $\frac{1}{8}$ inch.
Tire.....	Steel.		14x1 $\frac{1}{4}$ inch.
Bolts.....	Norway iron.	Tire.	14 inch.
Front hub bands.....	Band iron.		7 $\frac{1}{16}$ inch thick.
Pocker plates at neck.....	L. W.		2x1 $\frac{1}{2}$ inch.
Ends.....			2x3 $\frac{1}{8}$ inch.
Screws.....			No. 18.
Dash.....			15 inches high.
Outside and bottom bars.....		Oval.	5x3 $\frac{1}{8}$ inch.
Top and center bars.....		Oval.	5x3 $\frac{1}{8}$ inch.
Heels.....	Norway iron.		12x1 $\frac{1}{2}$ inch.
Lamp props.....	Norway iron.	Round.	7 $\frac{1}{16}$ inch.
Iron brake.....	Burden's iron.	Square.	14 inch.
Body portion.....		Half round.	
Extension taper to.....		Oval.	11 $\frac{1}{8}$ inch.
Bolts for dash, brakes and steps.....	Norway iron.		7 $\frac{1}{16}$ inch.
Bolts, body.....	Norway iron.		3 $\frac{1}{8}$ inch.
Top back bar to front carriage.....	Burden's iron.	Full oval.	11 $\frac{1}{8}$ inch.
Cross spring stay.....	Burden's iron.		12x5 $\frac{1}{8}$ inch.
Spring bearing.....			6 inches long.
Steps to front carriage.....	Sheet iron.		No. 10.
Pad.....			4x5 inches.
Body steps.....		Horseshoe.	6 $\frac{1}{2}$ x7 $\frac{1}{2}$ inches.
Shank.....	Low Moor iron.	Octagon.	7 $\frac{1}{8}$ inch.
At pad.....		Round.	5 $\frac{1}{8}$ inch.
Step cover.....	Sheet iron.		No. 12.
Stay.....	Ulster iron.	Square.	7 $\frac{1}{16}$ inch.
Plate for wooden brake.....	Ulster iron.	Thin half oval.	12x5 $\frac{1}{8}$ inch.
Spring bearing.....		Flat.	6 inches long.

No. 16.

Table of Kinds and Sizes of Iron Used in Constructing a Landau on Platform Springs, Track, front 4 feet 6 inches, back 4 feet 10 inches.

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened.....	Mail or Collinge.....	13 $\frac{3}{8}$ x8 inches.
Piece part.....	Low Moor iron.....		15 $\frac{1}{8}$ inches.
Springs.....			13 $\frac{1}{4}$ inches.
Front.....			6 plates.
Length.....			40 inches.
Open.....			11 $\frac{1}{2}$ inches.
Main and second plates.....	Best Swedes steel, oil temper.	Full elliptic.	No. 2.
Third and fourth plates.....			No. 3.
Fifth and sixth plates.....			No. 4.
Back.....			5 plates.
Length.....			40 inches.
Open.....			10 $\frac{1}{2}$ inches.
Main, 2d and 3d plates.....			No. 2.
Fourth and 5th plates.....			No. 3.
Cross springs.....			13 $\frac{1}{4}$ -inch, 5 plates.
Main, 2d and 3d plates.....			No. 2.
Additional plates.....			No. 3.
Arch.....			4 $\frac{1}{8}$ inches.
Fifth wheel.....		Full circle.....	24 inches.
Plates.....	Burden's iron.....		13 $\frac{1}{8}$ inch.
Upper section.....	Burden's iron.....	Half oval.....	$\frac{7}{16}$ inch thick.
Molding.....		Half round.....	$\frac{7}{16}$ x $\frac{3}{8}$ inch.
Hook.....	Norway iron.....		$\frac{1}{2}$ inch thick.
Bottom bed, bottom plate.....	Burden's iron.....	Half round.....	13 $\frac{1}{8}$ x $\frac{3}{4}$ inch.
Bottom bed, top plate.....	Burden's iron.....	Half oval.....	11 $\frac{1}{8}$ x $\frac{3}{8}$ inch.
Seat stay at spring bearing.....	Burden's iron.....		13 $\frac{1}{8}$ x $\frac{3}{4}$ inch.
End pieces.....	Burden's iron.....	Round.....	$\frac{3}{4}$ inch.
At the futchels.....			$\frac{3}{8}$ inch.
On the futchels, front.....			11 $\frac{1}{8}$ x $\frac{3}{4}$ inch.
Bottom plate of top bed.....	Norway iron.....	Flat half oval.....	11 $\frac{1}{2}$ x $\frac{3}{4}$ inch.
Top plate of top bed.....	Norway iron.....		11 $\frac{1}{4}$ x $\frac{5}{8}$ inch.
Ends tapered to.....			1 inch.
Bottom plate of futchels, front.....	Burden's iron.....		$\frac{3}{8}$ inch thick.
Tapered to.....			$\frac{1}{4}$ inch.
Center piece.....	Burden's iron.....	Square.....	1 inch.
Back end.....			$\frac{3}{8}$ inch thick.
Jaw plates to futchels.....	Band iron.....		$\frac{7}{16}$ inch.
Pole bridge.....	Ulster iron.....		13 $\frac{1}{4}$ x $\frac{3}{8}$ inch.
Bottom plates of punchcons.....	Ulster iron.....	Half oval.....	11 $\frac{1}{8}$ x $\frac{3}{8}$ inch.
King bolt plate of evener bar.....			$\frac{1}{2}$ inch thick.
Bottom plate of evener bar.....	Band iron.....		No. 8.
Box clips.....	Norway iron.....		13 $\frac{1}{4}$ x $\frac{1}{2}$ inch.
Securing clips.....	Norway iron.....		$\frac{3}{4}$ x $\frac{7}{16}$ inch.
Ends.....			$\frac{1}{2}$ inch.
Clip bars.....	Horseshoe iron.....		$\frac{7}{16}$ x $\frac{1}{2}$ inch.
King bolt.....	Norway iron.....		$\frac{7}{16}$ inch.
Socket arms.....	Norway iron.....	Oval.....	11 $\frac{1}{4}$ x $\frac{5}{8}$ inch.
Back loops at butt.....	Burden's iron.....	Square.....	15 $\frac{1}{8}$ inch.
Back ends.....		Oval.....	13 $\frac{1}{8}$ inch.
Book step.....			10x10 inches.
Backs.....	Sheet iron.....		No. 14.
Frames.....	Ulster iron.....		11 $\frac{1}{4}$ x $\frac{3}{8}$ inch.
Front, sheet iron.....			No. 12.
Step work.....		Round.....	$\frac{7}{16}$ inch.
Joints.....		Square.....	$\frac{7}{16}$ inch.
Horse shoe step.....	Sheet iron.....		7 $\frac{1}{2}$ x8 $\frac{1}{2}$ inches.
Shanks.....	Burden's iron.....	Octagon and round.....	1 inch.
Step cover.....	Sheet iron.....		No. 14.
Sides.....	Norway iron.....		1x1 $\frac{1}{8}$ inch.
Boot steps.....	Norway iron.....		5 $\frac{1}{2}$ x6 inches.
Tire.....	Low Moor iron.....		11 $\frac{1}{2}$ x $\frac{7}{16}$ inch.
Tire.....	Steel.....		13 $\frac{1}{8}$ x $\frac{3}{8}$ inch.
Tire.....	Compound iron.....		11 $\frac{1}{2}$ x $\frac{3}{8}$ inch.
Bolts.....	Norway iron.....	Tire.....	$\frac{1}{4}$ inch.
Hub hands, front.....	Band iron.....		No. 9.
Back.....	Band iron.....		No. 8.
Rock plates, circular.....	L. W. iron.....		3 $\frac{1}{2}$ x1 $\frac{1}{2}$ inch.
Angular.....	L. W. iron.....		4x1 $\frac{1}{2}$ inch.
Screws.....			No. 20.
Joints.....	Norway iron.....	Stamp joints.....	11 $\frac{1}{8}$ x $\frac{3}{4}$ inch.
Piece Part.....	Low Moor iron.....	Oval.....	1x $\frac{5}{8}$ inch.
Hinges for center of top.....	Norway iron.....		1x $\frac{1}{4}$ inch.
Weather plate.....	Band iron.....		$\frac{3}{8}$ inch.
Stays.....		Round.....	2 $\frac{1}{4}$ x $\frac{1}{16}$ inch.
Seat rail.....		Round.....	$\frac{1}{2}$ inch.
Securing bolts.....			$\frac{3}{8}$ inch.
Front fender, side and main bars.....	Ulster iron.....	Oval.....	$\frac{7}{16}$ x $\frac{7}{16}$ inch.
Outer bars.....	Ulster iron.....	Oval.....	$\frac{7}{16}$ x $\frac{3}{8}$ inch.
Toc board.....		Oval.....	11 $\frac{1}{2}$ x5 inch.
Screws.....			No. 14.
Lamp props at butts.....	Norway iron.....	Oval.....	$\frac{3}{4}$ inch.
Tapered at stem.....	Norway iron.....		$\frac{5}{8}$ inch.
Break plates.....	Burden's iron.....	Half round.....	13 $\frac{1}{4}$ x $\frac{3}{4}$ inch.
Spring bearings.....			6 inches.
Supporting bars, cross springs.....	Burden's iron.....		13 $\frac{1}{4}$ x $\frac{3}{4}$ inch.
Spring bearings.....			6 inches.
Ends.....		Oval.....	15 $\frac{1}{8}$ x $\frac{7}{16}$ inch.
T's.....	Norway iron.....	Flat half oval.....	11 $\frac{1}{2}$ x $\frac{1}{2}$ inch.
Clips.....	Norway iron.....		$\frac{7}{16}$ x $\frac{3}{8}$ inch.
Back bar of front carriage.....	Burden's iron.....	Oval.....	11 $\frac{1}{2}$ x1 $\frac{1}{8}$ inch.
T's.....	Norway iron.....	Flat half oval.....	11 $\frac{1}{4}$ x $\frac{7}{8}$ inch.

No. 17.

Tables of Sizes and Kinds of Iron Used in Constructing a Brett. Cee Springs, 4 feet 8 and 4 feet 10 inch Track.

Sectional Parts.	Metal.	Shape.	Size.
Axle.....	Case hardened iron.	Collinge.....	1 $\frac{1}{2}$ x8 inches.
Piece part.....	Low Moor iron.....		1 $\frac{1}{2}$ inches.
Springs, elliptic.....			1 $\frac{3}{4}$ inches.
Front.....			5 plates.
Length.....			39 inches.
Open.....			11 inches.
Main and second plates.....			No. 2.
Third and fourth plates.....			No. 3.
Fifth plate.....			No. 4.
Back.....	Swedes steel, oil temper.	Top plates, oval ends; bottom plates, square ends; button heads.	5 plates.
Length.....			36 inches.
Open.....			9 inches.
Main and second plates.....			No. 2.
Fourth and fifth plates.....			No. 3.
C springs.....			1 $\frac{3}{4}$ inches.
Plates.....			Seven.
First, 2d and 3d plates.....			No. 2.
Fourth and fifth plates.....			No. 3.
Sixth and seventh plates.....			No. 4.
Fifth wheel.....	Burden's iron.....		11x3 $\frac{3}{8}$ inches.
Upper half, if molded.....	Burden's iron.....	Half round.....	5 $\frac{1}{8}$ inch.
Hook, bolt portion.....	Norway iron.....		3 $\frac{3}{8}$ inch.
Bottom bed, bottom plate.....	Burden's iron.....	Full half round.....	1 $\frac{3}{4}$ x3 $\frac{1}{2}$ inch.
Bottom bed, top plate.....	Common iron.....	Half oval.....	11x1 $\frac{1}{2}$ inches.
Futchel stays, ends.....	Ulster iron.....	Round.....	3 $\frac{1}{4}$ inch.
Spring bearings.....	Ulster iron.....		13x3 $\frac{1}{2}$ inches.
Length.....		Half oval.....	6 inches.
Top bed, top plate.....	Norway iron.....	Half oval.....	13x1 $\frac{1}{2}$ inches.
Ends.....			1x $\frac{7}{8}$ inch.
Top bed, bottom plate.....	Norway iron.....	Half oval.....	13x1 $\frac{1}{2}$ inches.
Jaw plates.....	Band iron.....		$\frac{7}{8}$ inch.
King bolt.....	Norway iron.....		5 $\frac{1}{8}$ inch.
Socket arms.....	Norway iron.....	Oval.....	1x5 $\frac{3}{8}$ inch.
Plate portion.....			$\frac{7}{8}$ inch.
Ends.....		Oval.....	5x3 $\frac{3}{8}$ inch.
Bottom stay of futchels.....	Low Moor iron.....	Oval.....	7x1 $\frac{1}{2}$ inch.
Front end.....	Burden's iron.....		3 $\frac{3}{8}$ inch thick.
Back end.....	Burden's iron.....		1x5 $\frac{3}{8}$ inch.
Box clips.....	Norway iron.....		13x3 $\frac{3}{8}$ inches.
Securing clips.....	Norway iron.....		34x1 $\frac{1}{2}$ inch.
Ends.....			$\frac{7}{8}$ inch.
Clip yokes.....	Burden's iron.....		7x1 $\frac{1}{2}$ inch.
Pole hook.....	Norway iron.....		3 $\frac{3}{8}$ inch.
Pole stop.....	Common iron.....		1 $\frac{1}{2}$ inch.
Pole bridge.....	Burden's iron.....		13x1 $\frac{1}{2}$ inches.
Evener bar plate.....			$\frac{7}{8}$ inch thick.
Bolt.....	Norway iron.....		$\frac{7}{8}$ inch.
Bottom plate.....	Band iron.....		$\frac{7}{8}$ inch.
Toe-board plate-drag, front.....	Burden's iron.....	Half oval.....	11x3 $\frac{1}{2}$ inches.
Step for boot.....	Sheet iron.....		No. 10.
Pad.....		Square.....	5x5 $\frac{1}{2}$ inches.
Step for body.....	Sheet iron.....		No. 10.
Pad.....		Horse shoe.....	7x8 inches
Shank.....	Burden's iron.....	Octagon and round.....	7 $\frac{1}{8}$ inch.
Cover.....	Sheet iron.....		No. 14.
Shank.....			7x1 $\frac{1}{2}$ inch.
Bolts.....	Norway iron.....		$\frac{7}{8}$ inch.
If book step.....			9x10 inches.
Bolts.....			3 $\frac{3}{8}$ inch.
Front stay.....	Norway iron.....	Oval.....	11x3 $\frac{1}{2}$ inches.
Bottom stump joints.....	Norway iron.....		7x5 $\frac{3}{8}$ inch.
Piece part.....	Low Moor iron.....	Oval.....	7x1 $\frac{1}{2}$ inch.
Top stump joint.....	Norway iron.....		34x5 $\frac{3}{8}$ inch.
Piece part.....	Low Moor iron.....	Oval.....	34x1 $\frac{1}{2}$ inch.
Tire.....	Steel.....		11x1 $\frac{1}{2}$ inches.
Tire.....	Compound iron.....		13x3 $\frac{3}{8}$ inches.
Tire.....	Low Moor iron.....		13x1 $\frac{1}{2}$ inches.
Bolts.....	Norway iron.....	Tire.....	1 $\frac{1}{4}$ inch.
Hnb Bands, thick.....	Fall River iron.....		$\frac{3}{8}$ inch.
Back bands, thick.....	Fall River iron.....		1 $\frac{1}{8}$ inch.
Rocker plates, neck portion.....	L. W.....		31x1 $\frac{1}{2}$ inches.
Ends.....	L. W.....		31x3 $\frac{3}{8}$ inches.
For angular body, center.....	L. W.....		4x1 $\frac{1}{2}$ inches.
Ends.....	L. W.....		4x3 $\frac{3}{8}$ inches.
Screws.....			No. 20.
Seat rails.....	Burden's iron.....	Round.....	1 $\frac{1}{2}$ inch.
Front wings, inside bars.....	Low Moor iron.....	Oval.....	34x1 $\frac{1}{2}$ inch.
Outer and center bars.....	Pittsburgh iron.....	Oval.....	34x $\frac{7}{8}$ inch.
Bow wings, inside bars.....	Low Moor iron.....	Oval.....	34x3 $\frac{3}{8}$ inch.
Inside bars.....	Pittsburgh iron.....	Oval.....	34x $\frac{7}{8}$ inch.
Lamp prop.....	Norway iron.....	Round.....	5 $\frac{1}{8}$ inch.
Stay jacks.....	Burden's iron.....	Round.....	13x3 $\frac{3}{8}$ inch.
Ears.....	Norway iron.....		
Back spring bearings.....	Burden's iron.....		13x3 $\frac{1}{2}$ inches.
Length.....			7 inches.
Back portion.....		Half oval.....	11x3 $\frac{1}{2}$ inches.
Back loops.....	Burden's iron.....	Square.....	13 $\frac{3}{8}$ inches.
Front end.....		Half oval.....	
Back end.....		Oval.....	11x1 inches.
Strap bolt.....	Norway iron.....		3 $\frac{3}{8}$ inch.

No. 18.

**Table of Kinds and Sizes of Iron Used in Constructing a Coach, Hung upon Platform Springs;
Truck, 4 feet 10 inches:**

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened iron	Mail or Collinge.	1½x8½ inches.
Piece part.....	Low Moor iron		1½ inch.
Front.....			13½ inch.
Length.....			6 plates.
Open.....			40 inches.
Main and second plates.....			11½ inches.
Third and fourth plates.....			No. 2.
Fifth and sixth plates.....			No. 3.
Back.....			No. 4.
Length.....	Swedes steel, oil temper.	Ends of all plates, square; top plates drawn thin and cham- fered. Button heads.	5 plates.
Open.....			40 inches.
Main and second plates.....			10½ inches
Third and fourth plates.....			No. 2.
Fifth plate.....			No. 3.
Cross spring.....			No. 4.
Arch.....			5 plates.
Main, second and third plates.....			4½ inches.
Other plates.....			No. 2.
Fifth wheel.....	Low Moor iron	Half circle.	No. 3.
Bottom bed, bottom plate.....	Burden's iron	Full half oval.	18x½ inch.
Bottom bed, top plate.....	Burden's iron		14x½ inch.
Side stays at spring bearings.....			14x½ inch.
Front of bearing.....	Burden's iron	Round.	7½ inch.
Front end.....			7½ inch.
Back end.....	Burden's iron	Round.	7½ inch.
Front at futchel.....	Norway iron		1x¾ inch.
Center of bottom plate.....	Burden's iron	Square	1 inch.
Inside plate of futchels.....	Band iron		¾ inch.
Top bed, bottom plate.....	Norway iron	Full half oval.	11x¾ inch.
Top bed, top plate.....	Norway iron		11x¾ inch.
King bolt socket.....	Norway iron		11x¾ inch.
Arms.....		Swaged oval.	14x¾ inch.
Ends at futchel.....			1x½ inch.
King bolt.....	Norway iron		¾ inch.
Pole bridge.....	Ulster iron		13x¾ inch.
Bottom plate to puncheons.....	Ulster iron	Half oval.	11x¾ inch.
Bottom plate for draw bar.....	Band iron		¾ inch.
Top plate of draw bar.....	Ulster iron		½ inch thick.
King bolt plate of draw bar.....	Ulster iron		¾ inch.
Axle, box clips.....	Norway iron		13x½ inch.
Small clips.....	Burden's iron		3x½ inch.
Bolt ends.....			½ inch.
Clip bars.....	L. W. iron		7x½ inch.
Supporting bars to cross springs.....	Ulster iron	Swaged half oval.	12x¾ inch.
Spring bearing.....			6 inches long.
Tees.....	Norway iron	Full half oval.	12x½ inch.
Clip.....	Low Moor iron		7x¾ inch.
Back bar, front carriage.....	Ulster iron	Oval.	12x¾ inch.
Tees.....			14x¾ inch.
Front stay.....	Norway iron	Oval	13x¾ inch.
Brake plates.....	Burden's iron	Deep half round.	14x¾ inch.
Spring bearing.....			6 inches long.
Book step.....			10x10 inches.
Backs.....	Sheet iron		No. 14.
Frames.....	Ulster iron		14x¾ inch.
Front.....	Sheet iron		No. 12.
Step work.....		Round.	½ inch.
Joints.....		Square.	¾ inch.
Horseshoe steps.....			7½x8½ inch.
Pad.....	Sheet iron		No. 10.
Shank.....	Burden's iron	Octagon and round.	1 inch.
Step cover.....	Sheet iron		No. 14.
Shank.....	Ulster iron	Octagon and round.	¾ inch.
Tire.....	Compound iron.		1½x¾ inch.
Tire.....	Steel		13x¾ inch.
Bolts.....	Norway iron	Tire.	¼ inch.
Hub bands, front.....	Band iron		¾ inch thick.
Back.....	Norway iron		1x¾ inch.
Rocker plates, circular body.....	L. W. iron	Bar	3½x1½ inch.
Angular body.....			4x½ inch.
Screws.....			No. 20.
Top joints.....	Norway iron	Stunup joints	13x¾ inch.
Piece part.....	Burden's iron	Oval	1x¾ inch.
Top props.....			14 inch.
Hinges for center of top.....	Norway iron		1x½ inch.
Weather plate.....	Band iron		24x½ inch.
Stays.....		Round.	¾ inch.
Seat rail.....	Ulster iron	Round.	½ inch.
Drag front plate.....	Burden's iron	Half oval	12x¾ inch.
Lamp props.....	Ulster iron	Taper	3x¾ inch.
Boot steps.....	Sheet iron		No. 10.
Pads.....			6x6½ inches.
Front wing bars.....		Oval	3x¾ inch.
Bolts for securing irons to body.....	Norway iron		¾ inch.
Bolt for securing body to carriage.....	Norway iron		¾ inch.

No. 19.

**Table of Kinds and Sizes of Iron Used for a Carryall or Cheap Rockaway; Perch Carriage;
Two Elliptic Springs, 4 Feet 8 Inch or 4 Feet 10 Inch Track.**

Sectional Parts.	Metal.	Shape.	Size.
Axles, long stock.....	Case hardened iron.	Plain taper nut.....	11x7 inches.
Springs.....			13 $\frac{1}{2}$ inches.
Front.....			5 plates.
Length.....			38 inches.
Open.....			9 $\frac{1}{2}$ inches.
Main, second and third plates.....			No. 2.
Fourth plate.....			No. 3.
Fifth plate.....	Common grade black springs.	Full elliptic, button heads, square ends.	No. 4.
Back.....			6 plates.
Length.....			40 inches.
Open.....			10 inches.
Main, second and third plates.....			No. 2.
Fourth and fifth plates.....			No. 3.
Sixth plate.....			No. 4.
Bolts for securing front spring.....	Norway iron.....		$\frac{7}{8}$ inch.
For back spring.....	Norway iron.....		$\frac{3}{4}$ inch.
Fifth wheel.....	Malleable iron.....		16 inches.
Plates.....		Half round.....	1x $\frac{3}{8}$ inch.
Clips.....			1 $\frac{1}{2}$ inch wide.
Ends.....			$\frac{3}{8}$ inch.
King bolt.....	Norway iron.....	Plain.....	$\frac{5}{8}$ inch.
Stay, strap portion.....	Common iron.....	Flat.....	5x $\frac{3}{8}$ inch.
End.....			$\frac{3}{8}$ inch.
Head plate.....	Ulster iron.....		1 $\frac{1}{2}$ x $\frac{3}{8}$ inches.
At fifth wheel bearing.....			$\frac{1}{8}$ inch thick.
Perch plate.....	Common iron.....	Swaged.....	13x $\frac{3}{4}$ inches.
Ends.....	Refined iron.....		$\frac{3}{8}$ inch.
Bolts.....	Norway iron.....		$\frac{7}{8}$ inch.
Top plate.....	Norway iron.....	Half oval.....	14x $\frac{1}{4}$ inches.
Side stays, outside.....	Refined iron.....	Oval.....	3x $\frac{1}{16}$ inch.
Inner branches.....		Oval.....	5x $\frac{3}{8}$ inch.
Heels.....			7x $\frac{1}{16}$ inch.
At head block.....		Half oval.....	14x $\frac{1}{4}$ inches.
Clips, strap portion.....	Norway iron.....		1 $\frac{1}{4}$ inches wide.
Ends.....			$\frac{3}{8}$ inch.
Jack clips.....	Norway iron.....	Plain pattern.....	1 $\frac{1}{2}$ inches.
Ends.....			$\frac{1}{16}$ inch.
Bolt.....	Norway iron.....		$\frac{1}{2}$ inch.
Shaft iron, heads.....	Refined iron.....		
Strap.....	Refined iron.....	Swaged half round.....	13x $\frac{3}{8}$ inches.
Length on the bar.....			13 inches.
Bolts.....			3 inches.
Length front of bar.....			18 inches.
Bolts.....	Norway iron.....		4x $\frac{3}{8}$ inch.
Pole plate.....	Refined iron.....	Half oval.....	14x $\frac{3}{8}$ inches.
Top plate.....		Half oval.....	14x $\frac{1}{4}$ inches.
Stays, outer portion.....	Refined iron.....	Oval.....	3x $\frac{3}{8}$ inch.
Inner branches.....		Oval.....	5x $\frac{3}{8}$ inch.
Neck at end.....			$\frac{3}{4}$ inch.
At head.....			$\frac{5}{8}$ inch.
King holt stay.....	Norway iron.....		$\frac{7}{8}$ inch thick.
Neck portion.....		Oval.....	3x $\frac{1}{16}$ inch.
Tire.....	Compound iron.....		14x $\frac{3}{8}$ inches.
Bolts.....		Tire.....	$\frac{1}{4}$ inch.
Back bands of hmb.....	Band iron.....		No. 10.
Front bands.....	Malleable iron.....		
Dash.....	Ordinary iron.....	Oval.....	$\frac{9}{16}$ x $\frac{5}{16}$ inch.
Rail.....	Ordinary iron.....	Round.....	$\frac{3}{8}$ inch.
Lamp props.....	Norway iron.....	Round.....	$\frac{1}{16}$ inch.
At head.....		Round.....	$\frac{1}{2}$ inch.
Seat rails.....	Ulster iron.....	Round.....	$\frac{7}{8}$ inch.
Arms.....		Round.....	$\frac{3}{8}$ inch.
Heels.....	Norway iron.....		
Bolts.....		Tire.....	$\frac{7}{8}$ inch.
Lazy back stay.....	Refined iron.....	Oval.....	5x $\frac{3}{8}$ inch.
Screws.....			No. 14.
Step.....	Sheet iron.....	Ohlong.....	No. 10.
Pad bottom.....			6 $\frac{1}{2}$ x8 inches.
Top.....			5 $\frac{1}{2}$ x6 $\frac{1}{2}$ inches.
Main shank.....	Refined iron.....	Round.....	$\frac{3}{4}$ inch.
At pad.....			$\frac{5}{8}$ inch.
Top shank.....		Round.....	$\frac{5}{8}$ inch.
At pad.....			$\frac{7}{8}$ inch.
Stays.....		Oval.....	3 $\frac{1}{4}$ x $\frac{1}{16}$ inch.
Bolts.....	Norway iron.....		$\frac{3}{8}$ inch.
Front step.....	Sheet iron.....		No. 10.
Pad.....		Ohlong.....	5x6 inches.
Shank.....	Refined iron.....	Round.....	$\frac{3}{8}$ inch.
At pad.....		Round.....	$\frac{1}{16}$ inch.
Side branches.....	Norway iron.....	Oval.....	5x $\frac{3}{8}$ inch.
Body loops.....	Burden's iron.....		1 inch.
At hntt.....		Oval.....	1x $\frac{3}{4}$ inch.
At head.....		Oval.....	7x $\frac{5}{8}$ inch.
Strap part.....		Tapered.....	1 $\frac{1}{2}$ x $\frac{3}{4}$ inches.
Center.....	Ordinary iron.....	Half oval.....	11x $\frac{1}{4}$ inches.
Bolts at ends.....	Norway iron.....		$\frac{3}{4}$ inch.
At center.....			$\frac{1}{16}$ inch.
Rocker plates, straight.....	Refined iron.....		2x $\frac{3}{8}$ inches.
Curved.....	Refined iron.....		2x $\frac{1}{2}$ inches.
Screws.....			No. 16.

Table of Kinds and Sizes of Iron Used in Constructing a "Democratic" Wagon, Single Perch, on Two Springs. Track, 4 Feet 8 Inches.

Sectional Parts.	Metal.	Shape.	Size.
Axles, nut.....	Case hardened	Plain taper	1 $\frac{1}{2}$ x7 inches.
Piece part, back.....	Burden's iron		1x1 $\frac{1}{2}$ inches.
Piece part, front.....	Burden's iron		1x1 $\frac{1}{2}$ inches.
Springs.....			1 $\frac{1}{2}$ inches.
Front.....			5 plates.
Length.....			36 inches.
Open.....			8 inches.
Main plate.....			No. 2.
Second plate.....			No. 3.
Additional plates.....			No. 4.
Back.....			5 plates.
Length.....			38 inches.
Open.....			10 inches.
Main and second plates.....			No. 2.
Additional plates.....			No. 3.
Fifth wheel.....	Norway iron	Half circle	15 inches.
Plates.....		Half round	1 $\frac{1}{8}$ inches.
Bolts.....	Norway iron		$\frac{1}{8}$ inch.
Perch plate, ends.....	Norway iron		3 $\frac{1}{2}$ x1 $\frac{3}{8}$ inches.
Center.....	Common bar iron		3 $\frac{1}{2}$ x1 $\frac{3}{8}$ inches.
Bolts.....	Norway iron		$\frac{1}{8}$ inch.
Head plate.....	Norway iron		3 $\frac{1}{2}$ x1 $\frac{1}{2}$ inches.
Top plate.....	Burden's iron	Half oval	1 $\frac{1}{4}$ x $\frac{7}{8}$ inches.
Side stays, main.....	Burden's iron	Oval	2 $\frac{1}{2}$ x $\frac{5}{8}$ inch.
Inner.....	Burden's iron	Oval	3 $\frac{1}{2}$ x $\frac{5}{8}$ inch.
Ends of main stay.....	Norway iron	Half oval	1 $\frac{1}{4}$ x $\frac{3}{8}$ inches.
Bolts.....	Norway iron		$\frac{1}{8}$ inch.
Clip king bolt, strap.....	Norway iron		1 $\frac{1}{8}$ inches.
Bolt part.....			$\frac{3}{4}$ inch.
Clips.....	Norway iron	Plain strap	1 $\frac{1}{8}$ inches.
Bolts part.....			$\frac{1}{8}$ inch.
Shaft irons.....	Burden's iron	Swaged	1 $\frac{1}{4}$ x $\frac{7}{8}$ inches.
Length front of bar.....			16 inches.
Front on bar.....			12 inch.
Bolts.....	Norway iron		$\frac{1}{4}$ inch.
Jack clips.....	Norway iron	Bolt pattern	
Strap.....			1 $\frac{3}{8}$ inch.
Bolt end.....			$\frac{7}{8}$ inch.
Heads, length.....			1 $\frac{1}{2}$ inches.
Bolt.....			$\frac{1}{2}$ inch.
Pole, bottom plate.....	Burden's iron	Half oval	1 $\frac{1}{2}$ x1 $\frac{1}{4}$ inches.
Top plate.....	Norway iron		1x $\frac{1}{2}$ inches.
Main stay.....	Burden's iron	Oval	2 $\frac{1}{2}$ x $\frac{5}{8}$ inch.
Inner stay.....	Burden's iron	Oval	3 $\frac{1}{2}$ x $\frac{5}{8}$ inch.
Neck, at pole bar.....			$\frac{5}{8}$ inch.
At head.....			$\frac{1}{8}$ inch.
Whiffletree bolt.....	Norway iron		$\frac{1}{8}$ inch.
T bolts.....	Norway iron		$\frac{3}{8}$ inch.
Body loops, back.....	Burden's iron	Swaged	3 $\frac{1}{2}$ x1 $\frac{3}{8}$ inches.
Heads.....		Round	1 inch.
Bolts.....	Norway iron		$\frac{3}{8}$ inch.
Spring bar bolts.....	Norway iron		$\frac{3}{8}$ inch.
Tire.....	Steel		$\frac{3}{8}$ x1 $\frac{1}{4}$ inches.
Tire.....	Compound iron		1 $\frac{1}{4}$ x1 $\frac{1}{4}$ inches.
Tire.....	Common iron		$\frac{3}{8}$ x1 $\frac{1}{4}$ inches.
Bolts.....	Norway iron		$\frac{1}{8}$ inch.
Step.....	Norway iron	Square	
Pad.....			6x81 $\frac{1}{2}$ inches.
Shank.....	Burden's iron	Square and octagon	$\frac{7}{8}$ inch.
At pad.....		Oval	1 $\frac{1}{2}$ x $\frac{3}{4}$ inch.
Back stay.....	Burden's iron	Round	$\frac{5}{8}$ inch.
Bolts.....	Norway iron		$\frac{3}{8}$ inch.
Dash, light.....			15 inches.
Bars.....	Common iron	Oval	1 $\frac{1}{2}$ x $\frac{3}{4}$ inches.
Hub bands.....	Band iron		$\frac{1}{8}$ inch thick.
Side rails to seat.....	Burden's iron	Round	$\frac{1}{8}$ inch.

REPAIRING CASTINGS.

Small holes in castings can be filled with a mixed metal compound, of 2 parts antimony and 1 part bismuth, this metal will expand in cooling and make a perfect filling.

BLOCKING AN ANVIL.

It is important that the anvil be attached securely to the block, particularly where large irons are to be forged and bent; one of the simplest of the secure methods is to pass two flat bars through the block about six inches from the top, the centers of which, about one-half an inch wider apart than the length of the base of the anvil. Punch holes and cut in the threads before putting the bars in place, the holes being spaced to the width of the base, bore holes through the wood for bolts, then make plates that will clasp the corners of the base and pass bolts through these to the holes in the bars and run the bolts down tight; the underside of the corner irons should be cut away so as to have a bearing on the wood only on the extreme outside edge.

No. 21.

Tables of Kinds and Sizes of Iron Used in Constructing a 4 Seat Extension Top Photon.

Sectional Parts.	Metal.	Shape.	Size.
Axles, mail or nut.....	Case hardened.....	Plain taper.....	11x7 inches.
Piece part.....	Low Moor iron.....	Octagon and round.....	1 $\frac{1}{2}$ inches.
Springs.....	Swedes steel, oil temper.	Full elliptic; button heads; oval points.	1 $\frac{1}{2}$ inches.
Length.....			37 inches.
Open.....			10 inches.
Main and second plates.....			No. 2.
Additional plates.....			No. 3.
Fifth wheel.....	Norway iron.....	Flat.....	13x8 inches.
Bottom bed plate.....	Burden's iron.....		11x8 inches.
Spring bearing at futchel stay.....	Burden's iron.....	Flat.....	11x8 inches.
Futchel side stays.....	Burden's iron.....	Round.....	5 $\frac{1}{2}$ inch.
Front ends.....	Norway iron.....		
Arch plate, center.....	Burden's iron.....	Square.....	7 $\frac{1}{2}$ inch.
Front end.....	Norway iron.....		1 $\frac{1}{2}$ inch thick.
Jaw plates.....	Band iron.....		13x1 $\frac{1}{2}$ inch.
Pole bridge.....	Steel.....		11x1 $\frac{1}{2}$ inch.
King bolt.....	Norway iron.....	Socket pattern.....	5 $\frac{1}{2}$ inch.
Top plate for top bed.....	Burden's iron.....	Half oval.....	1 $\frac{1}{2}$ inch thick.
Evener bar bolt.....	Norway iron.....		1 $\frac{1}{2}$ inch.
Bolt plates.....	Burden's iron.....		3 $\frac{1}{2}$ inch thick.
Bottom plate of evener.....	Band iron.....		1 $\frac{1}{2}$ inch thick.
Screws.....			3 $\frac{1}{2}$ inch No. 10
Brake plates.....	Burden's iron.....	Swaged.....	5 $\frac{1}{2}$ inch thick.
Bottom plates.....	Common iron.....	Swaged.....	11x1 $\frac{1}{2}$ inch.
Tire.....	Steel.....		11x8 $\frac{1}{2}$ inch.
Tire.....	Compound iron.....		11x1 $\frac{1}{2}$ inch.
Tire.....	Common iron.....		11x8 $\frac{1}{2}$ inch.
Bolts.....	Norway iron.....	Tire.....	1 $\frac{1}{2}$ inch.
Hnb bands.....	Band iron.....		1 $\frac{1}{2}$ inch thick.
Dash.....			15 $\frac{1}{2}$ inches high.
Bars.....	Low Moor iron.....	Oval.....	5 $\frac{1}{2}$ x8 $\frac{1}{2}$ inch.
Heels.....	Norway iron.....		
Axle and box clips.....	Norway iron.....		11x8 $\frac{1}{2}$ inch.
Securing clips.....	Norway iron.....		5 $\frac{1}{2}$ x8 $\frac{1}{2}$ inch.
Step pads.....	Sheet iron.....		
Top step pad.....			5x5 $\frac{1}{2}$ inches.
Bottom step pad.....			5x6 inches.
Main branch.....	Burden's iron.....	Square.....	7 $\frac{1}{2}$ inch.
Lug.....	Norway iron.....	Flat.....	11x3 inch.
Upper branch.....	Burden's iron.....	Oval.....	5 $\frac{1}{2}$ x $\frac{1}{2}$ inch.
Shifting rail.....		Oval.....	5 $\frac{1}{2}$ x8 $\frac{1}{2}$ inch.
Side stays.....		Round.....	3 $\frac{1}{2}$ inch.
Stump joints, back.....	Norway iron.....		3 $\frac{1}{2}$ x1 $\frac{1}{2}$ inch.
Piece part.....	Burden's iron.....	Oval.....	5 $\frac{1}{2}$ x1 $\frac{1}{2}$ inch.
Stump joints, front.....	Norway iron.....		5 $\frac{1}{2}$ x8 $\frac{1}{2}$ inch.
Piece part.....	Burden's iron.....	Oval.....	1 $\frac{1}{2}$ x7 $\frac{1}{2}$ inch.
Rocker plates.....	L. W. iron.....		21x1 $\frac{1}{2}$ inch.
Screws.....			No. 12.
Iron brake.....	Low Moor iron.....	Swaged.....	11x11 $\frac{1}{2}$ inch.
Step bolts.....	Norway iron.....		3 $\frac{1}{2}$ inch.
Front body bolts.....	Norway iron.....		3 $\frac{1}{2}$ inch.
Additional bolts.....	Norway iron.....		1 $\frac{1}{2}$ inch.

FILES—THEIR DESIGNATIONS.

By the trade files have a variety of terms whereby they are distinguished. First there is the "cnt;" this has three forms—single cnt, double cut, and rasp; each has different degrees of coarseness, such as rough, coarse, bastard, 2d cnt and smooth. The coarser of the single cnt are sometimes called floats; the "rough" and "coarse" cnts are adapted to files to be used upon soft metals, the "bastard" and "2d cnt" are for wood and metals, the single cnt for saw teeth, etc. The double cnt have two coarses of chisel cnts crossing each other; the first coarse has a horizontal obliquity with the central line of the file ranging from 35 to 55 degrees; the second cnt crossing the first has a horizontal obliquity varying from 5 to 15 degrees. The double cut is applied to most files used by machinists, blacksmiths and wood-workers. The rasp cut differs entirely from the other, as each tooth is complete in itself, being cnt by a single-pointed tool; their coarseness is designated the same as the single and double cut.

Most files, whether single or double cut, have their edges single cnt, this cnt being regulated by that of the side. "Flat files" are technically those that are oblong through the center, the size being 4 inches in length, $\frac{1}{2}$ inch wide and $\frac{3}{8}$ of an inch thick; 6-inch, $\frac{5}{8}$ of an inch wide and $\frac{1}{2}$ of an inch thick; 8-inch, $\frac{3}{4}$ inch wide, $\frac{1}{2}$ of an inch thick; 10-inch, 1 inch wide and $\frac{1}{2}$ of an inch thick; 12-inch, 1 $\frac{1}{4}$ inches wide and $\frac{1}{2}$ of an inch thick; 14-inch, 1 $\frac{3}{4}$ inches wide and $\frac{1}{2}$ of an inch thick; 16-inch, 1 $\frac{1}{2}$ inches wide and $\frac{1}{2}$ of an inch thick.

Round files are circular in section and have a regular taper; they are made in lengths from 2 to 16 inches; they are generally single cut, bastard.

Half round files have one flat and one convex side. The bastard is usually double cut on both sides. The 2d cut and smooth are cut double on their flat sides, and single on the convex sides. Three square files have triangular sections; they are tapered to a point, and cut double (excepting saw files); sizes range from 10 to 14 inches; usually bastard, or 2d cut.

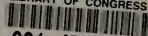
Table of Kinds and Sizes of Iron Used in Constructing a Six-seat Phaeton on Platform Springs, 4 Feet 10 Track.

Sectional Parts.	Metal.	Shape.	Size.
Axles.....	Case hardened iron.	Mail or nut.	1 1/2 x 7 1/2 inches.
Piece part.....	Low Moor iron.	Octagon and round.	1 1/2 inches.
Spring.....			1 3/4 inches.
Front.....			5 plates.
Length.....			37 inches.
Open.....			11 inches.
Main and second plates.....		Elliptic; French	No. 2.
Additional plates.....	Swedes steel, oil	heads; top plates	No. 3.
Back.....	temper.	spear points, bottom	5 plates.
Length.....		plates round points.	39 inches.
Open.....			9 1/2 inches.
Main plates.....			No. 2.
Second plates.....			No. 3.
Fourth and fifth plates.....			No. 5.
Fifth wheel.....	Norway iron.....	Half circle.....	13 x 7 1/2 inches.
Top section molding.....		Half round.....	5 1/2 inch.
Bottom bed plate.....	Burden's iron.....	Swaged.....	1 3/4 x 3 1/4 inches.
Spring bearing at fut-hel stays.....	Burden's iron.....	Flat.....	1 3/4 x 1 1/4 inches.
Fut-hel side stays.....	Burden's iron.....	Round.....	3 1/2 inch.
Jaw plates.....		Band iron.....	1 3/4 x 1 1/2 inches.
Arch plate.....	Burden's iron.....	Square.....	1 inch.
Front end.....			1 inch thick.
King bolt.....	Norway iron.....	Socket pattern.....	3 1/4 inch.
Plates.....	Norway iron.....		1 1/2 x 3 1/4 inches.
Plate for top bed.....	Norway iron.....	Half oval.....	3 1/2 inch thick.
Evener bar plates.....	Ulster iron.....	Flat.....	5 inch thick.
Bolt.....	Norway iron.....		5 1/2 inch.
Bottom plate.....	Band iron.....		1 1/2 inch thick.
Toe board plate.....	Norway iron.....	Half oval.....	1 1/2 x 1 1/2 inch.
Brake plate.....	Burden's iron.....	Swaged.....	3 1/4 x 7 1/2 inch.
Front quarter wing.....	Burden's iron.....	Oval.....	5 1/2 x 3 1/2 inch.
Inside bars.....	Burden's iron.....	Oval.....	5 1/2 x 3 1/2 inch.
Outside bars.....	Burden's iron.....	Oval.....	5 1/2 x 3 1/2 inch.
Rail to front cent.....	Burden's iron.....	Round.....	1 1/2 inch.
Pole bridge.....	Steel.....		1 1/2 x 1 1/4 inches.
Axle clips.....	Norway iron.....	Flat.....	1 3/4 x 3 1/4 inches.
Other clips.....	Norway iron.....	Flat.....	3 1/4 x 3 1/4 inch.
Step pad top.....	Norway iron.....	Gridiron.....	7 x 8 inches.
Bottom.....	Norway iron.....	Gridiron.....	6 1/2 x 7 inches.
Main branch.....	Ulster iron.....	Square and octagon.....	7 1/2 inch.
Small branch.....	Ulster iron.....	Octagon.....	5 1/2 inch.
Guard step pad.....	Sheet iron.....		N. 10 5 1/2 x 6 inc's.
Stump joints for bottom.....	Norway iron.....	Square.....	7 1/2 x 5 1/2 inch.
Pieced part.....	Ulster iron.....	Oval.....	3 1/4 x 1 1/2 inch.
Front joint.....	Norway iron.....	Square.....	3 1/4 x 5 1/2 inch.
Piece part.....	Ulster iron.....	Oval.....	5 1/2 x 7 1/2 inch.
Tire.....	Steel.....		1 1/4 x 1 1/4 inch.
Tire.....	Compound iron.....		1 1/4 x 1 1/2 inches.
Boils.....	Norway iron.....	Tire.....	1 1/2 inch.
Carrriage part bolts.....	Norway iron.....		3 1/2 inch.
Other bolts.....	Norway iron.....		1 1/2 inch.

FORGES.

The blacksmith's health and success depends much upon the arrangement of his forge, light, ventilation, and the situation of tool bench and anvil all contribute to success or failure. The forge itself should be about 3 feet 8 inches long and 3 feet 6 inches wide. The coal box, running across the end 8 inches wide and 10 inches deep. The water box full length of the forge 12 by 12 inches. The top of the tuyere should be about 4 1/2 inches below the level of the forge and about 6 inches from the back. The chimney should be so arranged that it will carry off all smoke and gas. To assist to this end a funnel bonnet of sheet iron should be erected over the fire, of size sufficient to form a receptacle for any extra body of smoke and hold it until it can be carried away through the chimney. The anvil should be so placed, if possible, that the blacksmith will not be compelled to stand with his back to the fire, as that position tends to bring on kidney troubles. The best position for the anvil to a right hand forge is to have the front of the anvil on a line with the outer end, and the anvil but about two feet from the forge. The height of the forge is not an arbitrary matter, as few workmen stand in similar position, while the height of the workman has much to do with the proper height of the face of the anvil, ordinarily 2 feet 4 inches is about the right height. When a forge is located on the ground floor, it is better to cut away the flooring immediately around the anvil block, and fill the opening with dirt a little above the level of the floor than to cover the space with sheet iron. The tool bench should be placed within easy reach of the blacksmith, and high enough to obviate stooping over to get the tools; a rail should be extended around three sides of the bench for a rack for all handle tools, and boarding of the top perforated to receive the points of the anvil tools. The hot-iron bin should be placed convenient to helper and smith. When the hand bellows is used it is best to attach it to the ceiling, as it is more out of the way there than when hung low. Keep everything neat and clean, have a place for everything and everything in its place.

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